THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. JANUARY 23, 1896. CHICAGO, ILL. NUMBER 4.

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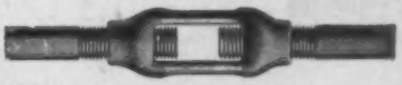
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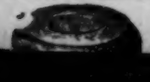
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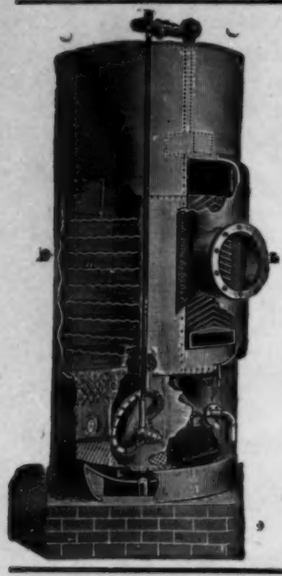

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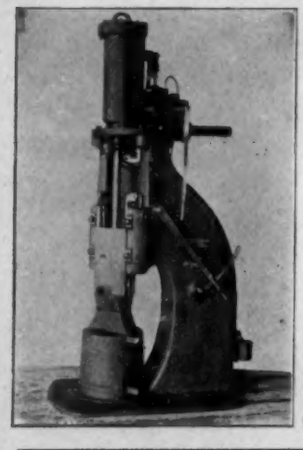

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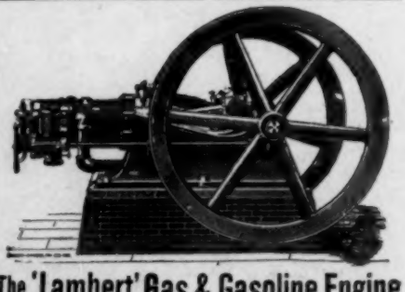

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THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. JANUARY 23, 1896. CHICAGO, ILL. NUMBER 4.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Favorable signs are more numerous in the iron trade, and the past fortnight has put a better aspect on nearly every department of the market. The advance in Bessemer pig iron and in steel billets noted last week has continued and in the case of the latter amounts now to $2.50 from the lowest point touched in the holidays. Finished material shows irregularities, but in nearly all lines there is a firmer feeling with increased buying. In part the larger demand is attributed to better consumption, in part to a desire on the part of buyers to anticipate higher prices. The disparity between current consumption and the capacity of rolling mills and steel works is still a dominating element in the situation; yet reports from all directions indicate that the past week has brought a larger tonnage to most mills than any preceeding one in three months. While there is price-cutting by producers anxious to fill up, the disposition is more general to hold to prices conforming to the higher basis for pig iron and steel. The official statistics of pig iron stocks at the close of 1895, with the unusual showing of but 5,000 tons more on hand than in the middle of the year, or about 15 days' supply, taken in connection with the reduction of output this month, have contributed to the advances on Bessemer, and to the firmer feeling on foundry iron. The volume of sales has not been so much of a factor, apparently, as a general appreciation of the certainty of enhanced costs. Foundry buyers are taking hold with somewhat more freedom, and in pipe iron, sales the past week have reached a good figure. The pipe foundries have been able to get a considerable cut from the $8 Birmingham figure in view of the light demand for gray forge by mills. Yet the situation from the standpoint of rolling mills has improved since our last review, and for the first time in weeks the tonnage of new business has exceeded the shipments on old contracts. With the advance in billets, there is a firmer feeling among producers of bar steel and 1.15., Pittsburg, is adhered to by some, while 1.10c seems to be minimum. The latest transactions in billets are at $18 to $18.50, with demand increasing. Wire rods are showing signs of activity and there have been a number of sales in Chicago and Central districts, at from $23 to $24, with the latter quotation maintained in the Cleveland district. The wire market shows increased activity which accounts for the improvement in rods. Plates are firmer in spots, some Pittsburg producers asking $1 advance, and 1.30c for tank steel is now more common than 1.25c. Beams and channels have not held their relative position in the past few weeks, 1.40c and 1 45c Pittsburg being the basis of recent sales. However, the outlook has improved, both for bridge and architectural work.

THE CLEVELAND DISTRICT.

While there are no new developments concerning iron ore, the advance in the price of Bessemer pig and the heavy production of that metal last year, as shown by statistics published this week, have been discussed with interest by the ore trade. The belief is expressed that the attitude of the ore interest has had not a little to do with the recovery in Bessemer, and that the course of the market furnishes confirmation of the arguments that have been made by ore producers for a stable arrangement insuring profitable mining and guaranteeing season's prices.

Pig Iron. Considerable activity in Bessemer iron is the feature of the week. Pittsburg furnaces are reported to have done a goodly share of the business, and valley producers have made some sales. Late transactions are on the basis of $12.25 valley furnace for spot iron and $12.50 for March, April and May deliveries, with some furnaces quoting $13 to $13.50 on forward deliveries. There is little expectation of any considerable buying by consuming interests for early consumption and the advances made are less traceable to tonnage than to the idleness of nearly half the valley stacks that were on Bessemer and the determination of furnaces to get the coke advance, and, on the ores they still have, a part of the extra price they will have to pay to replace them. There is a much more confident feeling among the furnace interest, and the growing of finished material demand is a special cause of encouragement. A better inquiry is reported for foundry iron, but sales are not noticeably larger. Some valley sellers are quoting $12.50 for No. 2 strong iron and $13.25 for No. 1. Sales of Scotch iron have been made in small lots at $12.25 for No. 2 and $13 for No. 1. Two cast pipe concerns in Northern Ohio have bought iron the past week—6,000 tons and 15,000 tons respectively. The exact basis is not obtainable but it is believed that for gray forge $11.15 Cleveland was cut on some of the Southern irons purchased.

Finished Material. There is more business this week in nearly every form of mill product. In connection with the meeting of the Merchant Bar Iron Association, still in session in Cleveland, it was developed that the past week turned the scale, in bringing to the mills a larger tonnage of orders than that of shipments out. The buying is well distributed, some of it coming from car shops and railroads, and some from jobbers whose stocks have been allowed to run down in waiting for the bottom to be reached. There is some car-buying in prospect. The Wheeling & Lake Erie and the Lake Shore roads will place 1,000 cars each, and the former is in the market for 10 locomotives and three bridges. We quote on bar iron 1.20c Cleveland and on bar steel 1.20c to 1.25c, the Pittsburgh minimum being 1.10c. A Toledo structural contract is pending, involving 700 tons, and bridge business is growing in volume. The plate market is irregular. The 1.25c Pittsburg basis for tank steel, represented in recent transactions, is no longer met by some mills, and 1.30c and 1.35c are current quotations. On beams and channels 1.40c and 1.45c Pittsburg, is the present market and on angles 1.25c. Some plate and bar contracts have been placed the past week by Northern Ohio agricultural concerns. Wire mills are finding a better demand and on wire rods, after long inactivity, several contracts are in sight, with $24 Cleveland as the present quotation. On billets $18.50 to $18.75 Cleveland is the present range of quotations. Old material is more active. A sale of 1,000 tons of old iron rails was made at $17 Cleveland, with No. 1 wrought scrap at $12, and cast scrap at $10.50.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Iron men generally report that the better feeling which predominated last week has been strengthened since then by reports from the Eastern markets, and while buyers do not appear to be taking hold very much more than they were a week ago still there is a little more inclination on their part to accept the prices that are being made. There is, of course, a possibility that quotations in some lines will be lower before they are higher, but in general it seems probable, from the present outlook, that the market is at the low point and the chances appear good for advances in quotations in the near future. One or two sales of round lots of iron and steel were made last week and there is a large inquiry which will probably develop into orders in a few weeks. Prices are firmer than they were a week ago, and while on some grades of material the quotations are being cut, in most instances they are being maintained. Collections have been very hard for some time past but appear to be getting easier.

PIG IRON.—Inquiries are in the market for several large lots of pig iron, both Northern and Southern, and it appears that buyers are only waiting to make sure the market is firm at the present quotations before placing their orders. So far as Northern iron is concerned, there seems to be very little danger that the present prices will be reduced, as the furnaces are not inclined to cut quotations on the business that is going. Only small orders were placed last week, the largest being for 500 tons. Southern iron is hardly as firm as Northern and the quotations given below have been cut from 25c to 50c a ton in the last week in several instances. The furnaces, however, are inclined to be a little more fixed in their views and it is not so easy to get a cut in price as it was a week ago. It is reported that pipe works in Northern Ohio were in the market last week for several thousand tons of gray forge iron and that one or two orders were placed by them. Lake Superior charcoal is in fairly good demand and one or two good sized orders were placed last week. Quotations are made as follows:

Lake Sup. Charcoal	$14 50@15 50	Southern No. 2 Soft	$ 12 60
Local Coke Fdy. No. 1	14 00@14 50	South'n Silveries No. 1	13 35
Local Coke Fdy. No. 2	13 50@14 00	South'n Silveries No. 2	12.85
Local Coke Fdy. No. 3	13 00@13 50	Jackson Co. Silveries	14 50@16 00
Local Scotch Fdy. No. 1	14 00@14 50	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2	13 50@14 00	Ohio Silveries No. 2	14 50@15 00
Local Scotch Fdy. No. 3	13 00@13 50	Ohio Strong Softeners	15 00@15 50
South'n Coke No. 1	12 85	Alabama Car Wheel	17 50@18 00
South'n Coke No. 2	12 60	Malleable Bessemer	
South'n Coke No. 3	12 35	Coke Bessemer	
Southern No. 1 Soft	12 85		

BARS.—It is reported that one of the Western railroads placed last week for 1,000 tons of bar iron at a figure considerably below the Association price. It was impossible to get details, but one explanation of the price reported is that it represents the price at Colorado mill, less an amount equivalent to the freight from Chicago to the Kansas destination of the material. Nothing approaching the price named in connection with this transaction has been made by any Central territory mill. An order for 500 tons was given out by a car works, and several orders for 100 tons and less were placed, all at full figures. Quotations are maintained by the Association mills at 1.30c for common iron and 1.40c for guaranteed. Soft steel bars from strictly billet stock are quoted at 1.35c.

RAILS AND TRACK SUPPLIES.—The inquiry continues good for small lots of rails, but so far no large business has been placed. Quotations are unchanged as follows: Rails, $29 and up; splice bars, 1.65c to 1.75c; track bolts, 2.25c to 2.45c; spikes, 1.85c to 1.90c.

BILLETS AND RODS.—The local mills have sold a few small lots of billets and rods at $18 and $23 respectively. The demand for billets has been very good and it is probable that some large orders will be placed very soon.

STRUCTURAL MATERIAL.—The largest contract let last week was for the Rock Island track elevation, calling for 3,000 tons. This is quite a good deal larger than the original specifications. General business has been very fair and is expected to continue good. Quotations are firm, except on beams and channels, which are a little weaker. Prices are as follows: Beams and channels, 1.70c to 1.75c; angles, 1.50c to 1.55c; plates, 1.50c to 1.55c; tees, 1.70c to 1.75c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—There has been a good demand for plates and several good orders were placed last week. Quotations are made as follows: Tank steel, 1.50c to 1.55c; flange steel, 1.75c to 1.80c; firebox steel, 2.85c to 5c; boiler tubes, 60 to 65 per cent discount.

MERCHANT STEEL.—Business has been excellent. Wagon and carriage manufacturers placed a number of large orders for tire steel last week. General business has also been good and the number and size of orders are considerably increased from last week. Quotations are firm as follows: Open-hearth spring, tire and machinery steel, 2c to 2.10c; smooth finished machinery steel, 1.80c to 1.85c; smooth finished tire 1.65c to 1.70c; tool steel, 5 50c to 7.50c; specials, 11c and upwards; Bessemer bars, 1.55c to 1.65c.

SHEETS.—Black sheets are in fair demand and orders are becoming a little more frequent. There was a very large inquiry in the market last week for corrugated iron from a consumer. Prices are made at 2.35c to 2.40c for No. 27 block. Galvanized sheets are selling in large quantities at 80 per cent discount. This figure is a little firmer than last week.

OLD RAILS AND WHEELS.—Dealers report a better demand for old material and it appears to them that business will be very much better after the first of next month. Prices are made at $13.50 to $15 on old wheels, $16 for old iron rails and $11 to $12, according to length, for old steel rails.

SCRAP.—The situation appears to be improving all the time and while the demand is only slightly larger than it was last week there seems every probability that it will increase considerably after the first of next month. The following are buying quotations furnished by dealers: Railroad forge, $11.50; dealer's forge, $10; No. 1 mill, $7.50; railroad cast, gross ton, $10; machinery cast, $11; axles, $14; cast borings, $5; wrought turnings, $6; axle turnings, $7; mixed steel, $8; stoveplates, $6 to $6.50; heavy melting steel, $10.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The indications last week that values of the cruder forms of material had scored an advance that is to be permanent have been strengthened in the week under review. The advance from $10 Bessemer pig in the valley is from $2.25 to $2.50 in the past two weeks. While the buying seems to be by intermediate interests, in fulfillment of sales made some time ago, it has demonstrated that furnacemen are not willing to turn their ore into pig on the basis of a fortnight ago, and, with the practical assurance that after May 1 ore will cost close to $1 a ton more than last year's price, are insisting on at least a small profit on present sales. In the latter part of last week several sales of Bessemer were made at from $11.50 to $12 in the valley. Within a few

days $12.25 has been paid for January and February iron and for deliveries to May 1, $12.50 at valley furnace is the basis. The sales of the past week have shown some deviation from the 75-cent freight difference between Pittsburg and valley iron, transactions in Pittsburg metal a portion of the time showing only from 25 to 50 cents advance over the valley price. The market to-day can be fairly quoted $13 to $13.25, Pittsburg. Forge iron has shown slightly increased firmness, but the marked decrease in puddling in the past two months prevents any noticeable advance. We quote gray forge at $10.75 to $11. A sale of 1,000 tons is reported at the latter figure. No. 2 foundry is quoted at $12.50 to $12.75 and No. 1 foundry at $13.25 and $13.50. Steel billets have made an advance nearly equal to that of the previous week. A sale of 3,000 tons in the latter part of last week was at $17.50 Wheeling; sales this week are at $17.75 Wheeling, while Pittsburg mills hold for $18 and $18.50. Finished material shows the impulse not only of the higher prices for pig iron and steel but in some lines of mill products there is a better demand. In structural material, while no very large work has come up, there is a fair run of small orders and bridge and building prospects are considered quite encouraging. We quote angles at 1.25c to 1.35c., beams and channels, to 15 inches, 1.45c to 1.50c, with some shading of quotations. Sheared bridge plates are quoted 1.45c to 1.50c and universal mill plates 1.40c to 1.45c. In sheets sales are not made more than 60 days ahead, makers anticipating advances in the near future, corresponding to the advances in sheet bars. A sale of the latter is reported at $19.50. On galvanized sheets discounts have changed to 75.10 and 5, and 75 and 5, and the advance is being maintained. On No. 27 common iron we quote 2.25c and 2.30c. There is a slight improvement in the demand for bar iron and steel. On the former, local mills have adopted the new national card of extras. The change in the Eastern base from a range of ¾ to 2 inches to that of 1 to 1⅞ inch means an advance on some sizes on which Eastern buyers have paid no extras. The indications are, however, that the list will be closely adhered to. Sales of common bar iron are reported at 1.20c, in the valley, and of steel at 1.15c., Pittsburg, with this figure shaded on some recent contracts. In wrought pipe there is a somewhat better outlook. Discounts are unchanged. The cast iron pipe trade has promise of large orders in the next few months. There is a better demand for wire rods, and the market is quoted $23 to $23.50. The demand for wire is better the past week. In the wire nail market the action of the manufacturers in guaranteeing prices for another 30 days has encouraged buying and the outlook is more satisfactory. From the Connellsville coke region there are reports of ovens going out, the idleness of 15 furnaces in the valleys and the Pittsburg district being partly the occasion. For the week endiug Jan. 11 there were 15,069 ovens active, with a total production of 146,080 tons. About 1,000 ovens went out in the following week and further reductions are expected. Shipments fell off about 1,000 cars.

Cincinnati. The past week has witnessed more activity in Southern iron than was seen in months. Pipe works in all sections of the country have been testing the strength of the furnaces, and a number of important deals have been closed aggregating upwards of 50,000 tons. Most of the Alabama furnaces are hopeful, and even optimistic. The decreased production and increased demand, together with the more cheerful financial outlook, lead them to believe that only patience and firmness are needed to restore prices to a profitable basis. There have been a few weak spots and the shrewd buyers have found them. Every large order that has been booked has served to strengthen the seller and indications are that those making the lowest prices will soon be full of orders. If the smaller buyers follow the larger in purchasing soon, and if rolling mills find a demand for their product, the future is assured. Just now mills are short of orders and say it is not possible to sell their finished material and at present prices they cannot keep even. The threatened strike of Alabama ore and coal miners has been averted. An inquiry for 10,000 tons of Bessemer has been handled by Pittsburg brokers and the impression arose that heavy purchases were contemplated. The deal was not made because the party preferred to make iron rather than pay the price asked. Collections have been unusually bad, but in the past few days there is an improvement.

Buffalo. The only feature to report from this district is that the consumption of foundry iron seems to be increasing. Considerable work seems to be in sight for the larger foundries. Lake Superior charcoal iron, that for a month or two has been quite inactive, is now much improved. Inquiries for that class of iron are more frequent, and generally lead to orders for immediate shipment to those who in the fall considered themselves covered for their winter's requirements. In general, more interest is being shown in foundry iron, as the time of the year approaches when orders are naturally placed for future wants. Several of the largest consumers of iron in other districts have been in the market for an unusual amount of pig iron.

Personal.

F. A. Emmerton, of Cleveland, chemist and mining engineer, has lately returned from a trip of six weeks spent in the examination of mineral lands in northern Michigan, Arkansas, and Tennessee, in the interest of Chicago and Eastern parties.

C. A. Ford, Kokomo, president; Theo. D. Morgan, vice-president and general manager; E. S. Walton, secretary and assistant treasurer; Daniel Goodykoontz, treasurer; are the officers elected at the annual meeting of The Atlanta Steel and Tin Plate Co., Atlanta, Ind., Jan. 14. C. A. Ford, Theo. D. Morgan, E. S. Walton, Z. T. Hobbs, Warren Goodykoontz, A. G. Walton, and Dr. A. D. Booth were elected as board of directors. A dividend of 10 per cent. was ordered by the board.

W. D. Mahaney, formerly western agent of the *American Machinist*, has lately become connected with the Jos. Dixon Crucible Co., and will represent this company in Western territory, looking after its interests in the graphite department. Mr. Mahaney has opened an office at 1315 1316 Monadnock Block, Chicago.

H. M. Curry's resignation of the treasurership of the Carnegie Steel Co. and his trip to the Pacific Coast for a stay of some weeks, are in pursuance of a purpose expressed some months ago, to take a rest that is certainly well earned. Mr. Gayley, general superintendent of blast furnaces, takes up some of the duties heretofore falling to Mr. Curry. The latter, it is understood, will assume another official position with the company, on his return from California.

John Fulton, mining engineer, of Johnstown, Pa., has spent most of his time at Talladega, Ala., in the past several months, preparing to get the Talladega furnace again in blast.

J. A. Weimer, president of the Weimer Machine Works Co., has been nominated for mayor of Lebanon, Pa.

F. P. Mills, of Ishpeming, Mich., one of the best known mining men on the Marquette range, for the past eight years agent of the Cleveland-Cliffs Iron Co., has resigned his position and will remove to Colorado Springs, Col. Mr. Mills's new position is the superintendence of important mining properties in Colorado.

A. P. Collins, superintendent of the Tecumseh (Ala.) Iron Co., was shot and killed, presumably by moonshiners, while on a hunting expedition, a few miles from his home.

THE IRON TRADE REVIEW

DEVOTED TO

IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

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NEW SPECIFICATIONS FOR MARINE STEEL.

SPECIAL CORRESPONDENCE OF THE IRON TRADE REVIEW:

WASHINGTON, D. C., Jan. 20.—In connection with the meeting of the Association of American Steel Manufacturers at the Arlington Hotel in this city, Saturday, Jan. 18, a communication was formally presented to the Board of Supervising Inspectors of Steam Vessels, embodying the changes which the association desires to have made in the present specifications for steel plates for marine boilers. The proposed new specifications were presented to the Board of Supervising Inspectors by C. L. Taylor, special agent, and Mr. McLeod, engineer, of the Carnegie Steel Co.; Capt. Porter, of the Spang Steel Co., Pittsburg; Mr. Price, of the Cambria Iron Co., Johnstown, Pa.; A. F. Huston, first vice-president of the Lukens Iron & Steel Co., Coatesville, Pa., and H. H. Campbell, superintendent of the Pennsylvania Steel Co., Steelton, Pa.

The specifications submitted by the association provide in the first paragraph that all steel for marine boiler plates must be made by the open-hearth process and be of domestic manufacture. Paragraphs Nos. 2 and 3 prescribe the form of the test piece. Elongation to be at least 25 per cent and reduction of area the same as called for by the present rules. Paragaph No. 4 provides that "the maximum figure which can be stamped upon the steel as indicating its tensile strength shall be 60,000 pounds per square inch and the factor of safety in all cases shall be five. Paragraph No. 5 fixes the limit of phosphorus at .06 and of sulphur at .04 per cent.

In urging these changes the communication of the Steel Manufacturers' Association submitted that "under the present law there is nothing to prevent a boiler maker from ordering a steel with a tensile strength of 70,000 pounds, or even 80,000 pounds per square inch and using a proportionately high sterm pressure. The cost of such steel to the manufacturer is no greater than of a soft metal, so that a protest against it does not arise from any mercenary motives, but it is the unanimous opinion of the Association of American Steel Manufacturers that not only is such an increase in steam power unwarranted and dangerous, but that such hard steel is unfit for steam boilers no matter what the pressure may be. The temptation to order such material will be removed if no increase in steam pressure is allowed for an increase in tensile strength above 60,000 pounds per square inch." The association refers to the fact that as the practice of the Board of Supervising Inspectors is based upon the results deduced from the old system of grooved test, and to the further fact that such a test gives a tensile strength 10,000 pounds per square inch above that which would be obtained from a parallel-sided test piece. Thus, it shows, if grooved test pieces gave an ultimate strength of 60,000 pounds per square inch, then the real strength of the piece would be about 50,000 pounds per square inch, tested in a strip with parallel sides, this being now the accepted method throughout the engineering world. The old requirement of the Board calling for a factor of safety of 6 would mean for a stress of 10,000 pounds per square inch, 60,000 pounds ultimate strength, determined by the grooved test piece. The committee points out the proposed factor of safety of 5, under the modern system of tests, really insures the same ultimate strength in the plate and obviates any necessity for a change in the allowable steam pressure of boilers. Concerning the chemical test proposed, which is new, the steel manufacturers state that "there may be some difference of opinion among metallurgists as to the exact effect of certain elements upon the properties of steel, but there is perfect unanimity in regard to the injurious effect of phosphorus and sulphur. Under the present rules of the Board it is perfectly possible for a manufacturer to use a metal for boilers which would not be accepted by the majority of engineers for the most important work; and it is absolutely certain that this proposed clause would be a long step in the direction of a much better and safer metal, while it would not materially enhance the cost." In deciding upon the limits asked for, the association recognized that some might desire a lower percentage of both elements, but it was admitted that the .06 for phosphorus and .04 for sulphur would insure a reliable material in boilers, while under present specifications there is no such guarantee.

It is expected that action on the proposed specifications will be taken at an early date.

NATIONAL BAR IRON ASSOCIATION.

The National Bar Iron Association held its first annual meeting under the constitution adopted in December, at Pittsburg, on Tuesday, Jan. 21. The principal business, apart from the election of officers, was the formal adoption of the national card of bar iron extras which had been signed by the various mills represented in the association. Three additions were made to the list, as printed in these columns two weeks ago. Under "flats" the following should appear, in addition to the sizes then given:

4¼ to 6 x1 1-16 to 1½	4-10 extra.
6¼ to 8 x1 1-16 to 1½	6-10 "
8¼ to 10x1 1-16 to 1½	9-10 "

In addition to the mills East and West, heretofore represented in the movement, all the Pittsburg iron mills joined the association at this meeting. This step means that but one list of extras, instead of three, will prevail hereafter—a result well worth to the bar iron trade all the persistent effort that has been expended on the new organization. The officers hosen at the original Pittsburg meeting were re-elected. They are: President, James G. Caldwell, Louisville, Ky.; vice president, H. T. Wallace, Wilmington, Del; secretary, J. S. Elverson, Catasauqua, Pa.; treasurer, Geo. M. Bard, Muncie, Ind.; executive committee, James G. Caldwell, H. T. Wallace, and J. S. Elverson; A. R. Whitney, New York; C. C. Kauffman, Columbia, Pa.; C. N. Schmick, Leetonia, O.; W. B. Ridgley, Springfield, Ill.; W. E. Taylor, Youngstown, O.; H. A. Fuller, Cleveland; Col. F. A. Mysenberg, St. Louis.

The association has nothing to do with prices, beyond the classification of extras. The next annual meeting will be held at the Hoffman House, New York, on the third Tuesday in January, 1897. About 30 firms were represented at the Pittsburg meeting.

Recent Boiler Plate Tests.

Some interesting results have been obtained by the Paxton Rolling Mills, of Harrisburg, Pa., on tests of boiler plates for 20 Russian locomotives now building at the Baldwin Locomotive Works. The steel had to show a tensile strength of 35 to 42 kilos. per square miillmetre (about 50,000 to 60,000 lbs. per square inch), and an elongation in 8 in. of 25 per cent, both longitudinal and transverse. With the exception of 20 plates ⅝ by 87 in. wide, the material varied from ½ to ¾ in. thick by 74 in. wide and under. Of the 104 plates rolled, three failed in tensile and one on gauge. In elongation the remaining 100 plates averaged 27 46 per cent in the longitudinal direction and 27.90 per cent in the transverse—the latter result not generally looked for. All the steel slabs were furnished by the Pennsylvania Steel Co., made in open hearth basic furnaces, and showed an average analysis as follows: Carbon, 0.165; phosphorus, 0.014; manganese, 0.37, and sulphur, 0.27.

NATIONAL ASSOCIATION OF MANUFACTURERS

Reciprocity is the keynote of the second as of the first convention of the National Association of Manufacturers, and the building up of foreign trade in the manufactured products of this country, as one help to the restoration of the favorable balance of trade that has lately been conspicuous by its absence. With American securities coming back, and with other countries increasingly contributing to the world's demand for agricultural products, which the American farmer has so largely supplied heretofore, there is greater reason than ever for effort in the extension of foreign markets for American manufactured products. Yet we believe that the more direct route to a market for the American agriculturist would be tariff legislation reducing the importations of manufactured goods to this country and giving a larger home market both for our agricultural and manufactured products. This, coupled with reciprocity and the building up of a strong merchant marine, may well command the united effort of the members of the National Association of Manufacturers. It is a good augury of the permanence and usefulness of the association that at both the Cincinnati convention and the Chicago convention of this week, it has stuck well to its text and has not been diverted into side issues.

The anuual convention of the National Association of Manufacturers is being held at the Central Music Hall, Chicago, this week. The first meeting opened at 11 A. M., on Tuesday, with about 250 members present, representing all parts of the United States. President Thomas Dolan of the association made the opening remarks, in which references to the policy of protection to American industries, the need of a more equitable tariff and the advantages to be obtained by a return to reciprocity relations with foreign countries were greeted with enthusiasm.

The following committee were announced by Secretary E. P. Wilson as having been appointed by thepresident:

Committee on resolutions—Fred S. Fish, South Bend, Ind.; Charles Davis, Cincinnati; C. C. McDonald, St. Louis; Cyrus Elder, Johnstown, Pa.; H. C. Valentine, New York; Warren J. Willets, Three Rivers, Mich.; Willard Warner, Chattanooga, Tenn.; Charles Heber Clark, Philadelphia; E. O. Turner, Chicago; W. J. Cochran, New York; H. G. Morse, Wilmington, Del., and C. H. Harding, Philadelphia.

Committee on revision of constitution—Thomas McDougall, Cincinnati; C. H. Clark, Philadelphia; F. S. Fish, South Bend, Ind.; Chas. M. Blackstock, Sheboygan, Wis.; James Powell, Cincinnati; T. H. Martin, Atlanta, Ga.; James Phillips, Jr., Fitchburg, Mass.; H. L. Storey, Pasadena, Cal.; T. C. Search, Philadelphia; W. W. Kimball, Chicago; C. L. Talles, Hartford, Conn., and Mr. Van Wert, Newark, N. J.

General committee, to whom will be referred questions of a a miscellaneous nature which will come before the convention—John B. Howarth, Detroit; J. G. Battelle, Piqua; John Oliver, Atlanta; James G. Hamilton, Chino, Cal.; Richard Campeau, St. Louis; J. B. Wood, Indianapolis; Elliott Durand, Chicago; Mr. Hart, New Britain, Conn.; James Powell. Cincinnati; John A. Lewis, Meridian, Miss.

Committee on credentials—F. W. Sivyer, Milwaukee; J. F. Taylor, Cincinnati; J. N. Hanson, Macon, Ga.; Charles E. Whitman, St. Louis; J. N. Knowles, San Francisco; Robert Denham, Philadelphia; W. H. Hanna, Indianapolis; John M. Cutler, Chicago; Charles H. Schieren, Booklyn; Elwyn H. Lovejoy, Lowell, Mass.

Committee on nominations—Pliny Jewell, Hartford, Conn.; E. M. Thresher, Dayton, Ohio; T. H. Martin, Atlanta, Ga.; J. P. Grundy, Bristol, Pa.; Richard D. Campion, Philadelphia; C. D. Mitchell, Chattanooga, Tenn.; D. M. Parry, Indianapolis; H. S. Burkhardt, Chicago; H. M. Conger, Milwaukee; Charles A. Carlisle, South Bend, Ind.; Warner Miller, New York.

The Chair then introduced Mr. Thomas McDougall, of Cincinnati, who made a forcible address on the general policy of securing home markets for home producers, and the advisability of holding sessions of legislative bodies less frequently, to prevent constant recurrence of the agitation of tariff and financial questions.

WEDNESDAY'S SESSION.

On Wednesday morning there was a much larger attendance than on Tuesday, 400 members being present. The first business of importance was the report of the special committee on oriental manufacturing industries, which covered particularly a report on the manufacture of cotton goods by Japan, and went on to say: "But Japan does not confine herself to spinning cotton. Her people are introducing a great variety of manufacturing industries, all using improved machinery, and they are imitating the patterns and inventions of the western nations with impunity, because there is no protection for either the patents or trade-marks of the foreigners in Japan." The report then called attention to the danger of Japan underselling American manufacturers in America, and to the fact that "Articles of Japanese manufacture have appeared in our Eastern cities, rivaling and underselling American articles suitable for similar purposes."

The report wound up by the presentation of the following resolution, which was adopted unanimously:

Resolved, by the National Association of American Manufacturers, in convention assembled, in Chicago, Jan. 22, 1896, that the Senate of the United States, is hereby respectfully requested to appoint a commission, or to direct one of its own committees, to inquire respecting the alleged invasion of our market and the menace offered to American manufacturing industry by the products of cheap oriental labor, and to determine what is the cause of this menace and what means should be adopted to avert the threatened injury to domestic producers.

The committee on resolutions presented a report restating the resolution adopted at the meeting in Cincinnati, Jan. 22, 1895, as the cardinal basis for the establishment of the National Association of Manufacturers. These resolutions declared for a home market for home producers; for the largest possible extension of foreign trade relations; for the principle of reciprocity in national legislation to develop reciprocal trade relations with foreign countries; for a judicious system of subsidies to American shipping to restore and expand the merchant marine; for the improvement of national and artificial waterways to the full needs of commerce and for the construction and operation of the Nicaragua Canal under the control of the Federal Government.

A resolution empowering the executive committee to establish agencies to further the work of the Association was then adopted. After further routine business the convention adjourned until Thursday.

Lake Superior Iron Mines.

Referring to the leases given by the Iron-Cliffs Co., for developing lean ores, *Iron Ore*, of Ishpeming, Mich., says: The Iron-Cliffs Co. is giving very liberal leases for developing this class of ores. The latter are not worth much in the market, and those who do the mining must have liberal leases, but these ores are used for mixture with the fine-grained ones of the Mesabi range that are lacking in silica. By the use of one ton of the high-silica ores of this range several tons of Mesabi ores can be advantageously smelted. If there was not these silicious ores at hand the consumer would take the high-grade ores of the Marquette and other old ranges. When the Iron-Cliffs assists the Mesabi mines to market ores it injures the sale of its own regular grade ores, and one could not blame them if they refused to grant options for mines of this class. While the lean ore deposits give employment to a few men they are not of such importance to labor or commercial interests in this county as attaches to the ores of better class."

The Minnesota Iron Co., has closed its option on the Virginia or Moose property, at the townsite of Virginia, and will mine 112,000 tons a year on a lease of 18 cents. The Minnesota company has now under option on the Mesabi range about 13,000 acres of land, supposed to be mineral bearing.

THE Claire Furnace Co., of Sharpsville, Pa., with its one stack, 75x16 feet, produced in 1895, 75,634 gross tons of Bessemer pig iron, an average of 207 tons a day. The rated annual capacity of the furnace is 60,000 tons.

DEATH OF CHARLES DAYTON ARMS.

Charles D. Arms, who has been a prominent figure in the industrial life of the Mahoning Valley for the past 40 years, and most of that time identified with iron manufacturer, died at his home in Youngstown, O., Friday, Jan. 17. He was born in Wayne county, N. Y., nearly 70 years ago. His connection with the business life of Youngstown began in 1844, when he formed a mercantile partnership with the late Jonathan Warner. Later Mr. Arms engaged in contracting and in coal mining. He was quite successful in his coal operations. One of the most notable of these enterprises was the Church Hill Coal Co., which operated mines on an extensive scale at Church Hill, O., the product of this property reaching a large total. Rolling mill operations at Portsmouth, O., engaged Mr. Arms as well as coal mining, and he also had an interest in one of the original companies operating the Valley mill at Youngstown—Wick, Ridgeway & Co.

Mr. Arms spent one or two years in the Black Hills country and his prospecting work was well rewarded. Silver mines in Arizona, New Mexico, and Colorado, in which he had an interest, proved very profitable. His various mining and other industrial holdings are supposed to represent in the neighborhood of $1,000,000.

As president of the Mahoning Valley Iron Co., Mr. Arms, since the death of Henry O. Bonnell, has given more time than formerly to the affairs of the company. In spite of his success

in accumulating wealth, Mr. Arms was a man of simple tastes and free from any ostentation. He was a close student of business and economic questions on their practical side. Both in his business and his social life, reticence was a marked characteristic.

The funeral at the residence of the deceased on Wick ave., Youngstown, on Monday, was attended by many, including friends from other cities. The honorary pall bearers were E. B. Page, N. K. Fairbanks, Henry Tod, W. J. Hitchcock, J. P. Jefferson, J. L. Botsford, W. S. Bonnell, Robert McCurdy, J. H. McEwen, William J. Edwards, John C. Wick, Henry Wick, D. M. Hyman, W. J. McKinnie, Evan Morris, John Tod, J. G. Butler, Jr., Dr. John Manning, Thomas H. Wells, Walter L. Campbell, Tod Ford, George D. Wick, H. B. Perkins, Simon Perkins, Ralph Wick, Thomas W. Sanderson, L. E. Cochran, C. D. Hine, H. M. Garlick, Thomas H. Wilson, William Tod, Paul Jones, P. M. Hitchcock, W. H. Baldwin, James Mackey, James Parmelee, Richard Brown, Anson Bentley, A. J. McCartney and Henry H. Stambaugh. The active pallbearers were J. A. Campbell, John Thompson, John K. Weir, Edward McVey, John D. Milligan, John Noll, Andrew Lawton, R. E. Daniels, Edward McGinnis and Patrick Manley, old employes of the Mahoning Valley Iron Co.

Mr. Arms is survived by his wife and by six daughters: Mrs. Martyn Bonnell, of Cleveland; Mrs. Harry Bonnell, Miss Kate Arms, Miss Caroline Arms, Mrs. Harry Robinson and Miss Olive Arms, all of Youngstown.

SHOP AND FOUNDRY NOTES.

Cast Iron and Fly-Wheel Breaks.—This month brings at least three serious accidents by the break of large fly-wheels, and the future will no doubt furnish the same proportion until there is a limitation of some kind to the methods and material now employed. Cast iron is not a suitable material for such wheels, and is not necessary. We do not say cast wheels, because that is absurd, and has been abandoned for the same reason that cast spokes and rims must be before long. It was something, or indeed a good deal, to be rid of inherent strains due to casting whole wheels. It was going half way, but there will be no immunity from accident until this material is discarded. Methods of construction with fibrous material have advanced so fast that people have not perceived how it can be applied to fly-weels. They continue in a rut, bolting up huge masses of cast iron to move at from 60 to 100 feet a second when there is no warrant for such a thing in analogous construction. For example, the lateral or circumferential strain on the shell of a boiler is not different from centrifugal strain on a wheel rim, but no one thinks of making cast-iron boiler shells.—[Industry, San Francisco.

Compressed Air Saves a Big Core.—Kettles used for melting lead are cast by the Riverside Iron Co., of Kansas City, Mo., for the Consolidated Smelting & Iron Co. One of these, recently cast, was 11′ 5″ in diameter and weighed 18,000 pounds. The bottom was concave on the outside, that shape being best both for fuel economy and as reducing the liability to crack. The kettle was 2′ 6″ deep in the center, and 3′ deep at the sides. It would hold 140,000 pounds of melted lead. When the core was lowered in place, previous to pouring, it was found that a little trifling alteration was necessary, and when it had been raised again about eight inches the chain broke. As the core weighed 14,000 ponnds, a complete wreck was naturally looked for, but, to the astonishment of every one, the core was uninjured. The air in the mold let it down so gently that no shock was perceptible. The kettle was finally cast successfully.

Figured a Little and Guessed a Good Deal.—An engineer told me recently of an odd experience that he had not long ago. He had made the general assembled drawing for a new machine and it had been sent out to two parties, from whom bids were requested. After these had been received, the parties interested in the device concluded that it would be safer to supply the builders with a complete set of detail drawings, in order that the construction of the machine might be in exact accordance with the ideas of the owners. This was done, and the manufacturers asked to revise their bids. Now, on the first estimate A had offered to do the work for $500, while B wanted $750. After the receipt of the details, A wrote that "inasmuch as an examination of the details show that a great change has been made in the construction, and that the apparatus will be much more expensive to construct than the original drawing indicated, we shall be obliged to withdraw our previous offer and state that our price for the job will be $650." By the same mail there came a letter from B, in which he said: "We are pleased to say that upon an examination of the details just received, it is evident that your machine has been greatly simplified in construction, when compared with the drawings originally sent us, and we can therefore quote you $500 as the price for the work." As the shops had about equal facilities, it is very evident that some one did a little figuring and a great deal of guessing in one or both of these establishments.—[J. H. Allen in Dixie.

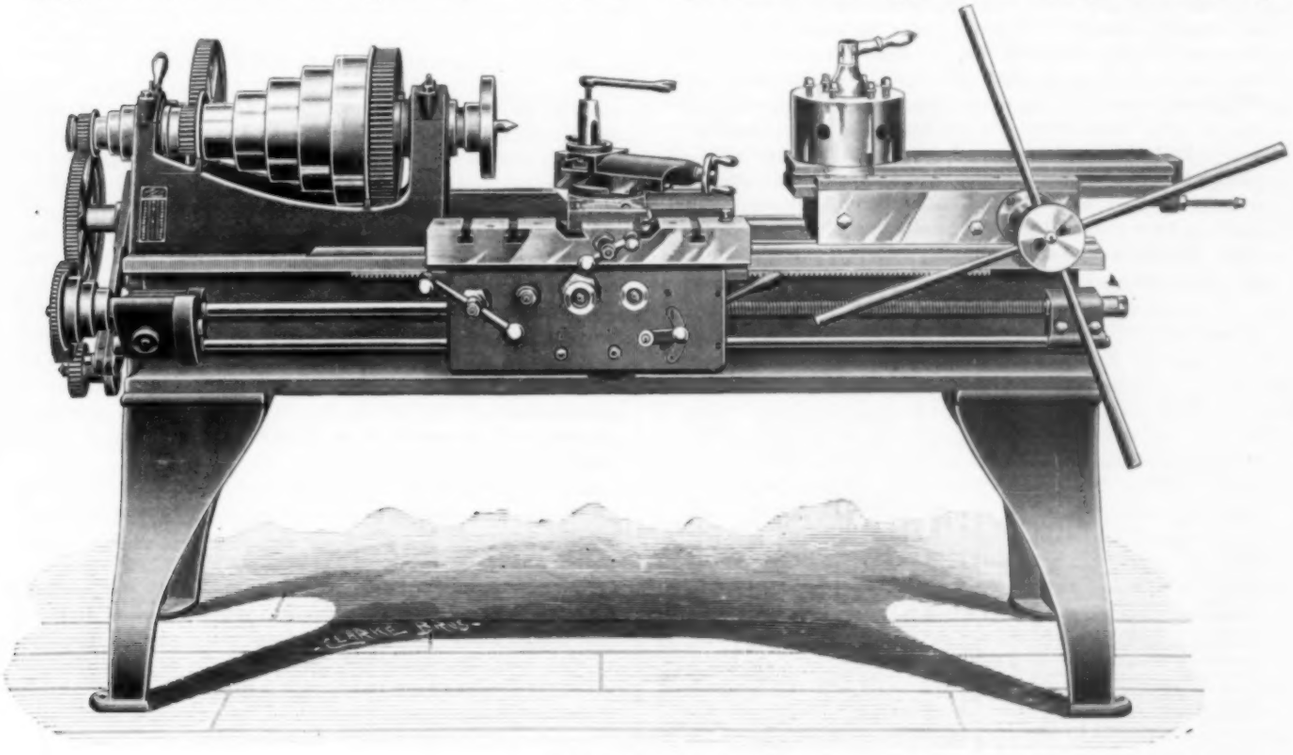
THE Lodge & Shipley Machine Tool Co., of Cincinnati, has been giving especial attention to the manufacture of a tool room lathe, combining all the best points of a standard, or old-fashioned, lathe with the quick change of feeds and screw cutting contained in all the engine lathes manufactured by this company. It also has graduated length and cross feeds and graduated set-over of tailstock. An improved taper attachment which requires the setting or releasing of only one screw to connect or disconnect it, is a feature appreciated by all who have used this tool.

18-INCH TURRET ENGINE LATHE.

An 18-inch engine lathe with turret is manufactured by the Springfield Machine Tool Co., Springfield, O., in response to the demand for rapid lathe work. Where the original design of an engine lathe contemplates a turret and sliding carriage in place of foot-block or tail stock, and the turret has not been provided as an after thought, the combination of turret and lathe gives special advantages. In the lathe illustrated herewith the wearing surfaces for taking the thrust on live spindle were made of unusual proportions, having the turret feature in view, and ample provision was made to compensate for all wear tending to destroy the perfect alignment of the turret.

The revolution of the turret is either automatic or by hand and it is made with or without power feed and stop. Tool steel is used for the parts necessary for automatic revolution and surfaces subject to abrasion are hardened. The turret is nine inches in diameter, is bored to receive six tools, and has a movement of 10 inches.

The spindle is threaded but two-thirds of its length with a U. S. S. thread of four to the inch. This gives the face plate a straight bearing of one-third its length on the nose of spindle



18-INCH TURRET ENGINE LATHE.

which aids in putting it in place and adds to wearing qualities. A desirable feature allows the use of an endless feed-belt, avoiding all the annoyance due to lacing or hooks. This permits of giving the desired tension to the belt, so that in an extra heavy cut it can be tightened to prevent slipping and again slackened when the heavy duty is over. The principal dimensions are as follows: Diameter of front journal of spindle, 2¾ in.; length of front journal of spindle, 4½ in.; diameter of hole through spindle, 1 5-16 in.; diameter of largest step of cone, 12 in.; width of belt, 2½ in.; ratio of back gearing, 12 to 1; swing over bed, 18¼ in.; swing over carriage, 12 in.; weight, 2,200 lbs.

THE Davis & Egan Machine Tool Co., Cincinnati, reports that its business the past week has been exceptionally good for this time of year. Orders from the Davis Sewing Machine Co., of Dayton; the Dublin & Coldwater R. R. and the C., N. O. & T. P. R. R. are included in contracts closed. A number of inquiries from foreign countries for bicycle machinery and other tools have come in. The tools of this company are gaining a strong foothold in England, Germany and France. Though running to full capacity the company cannot get orders out fast enough, and business now taken will keep the works busy to March 1.

PUBLICATIONS RECEIVED.

A unique thing in industrial literature is "A Third of a Century of Progress," a brochure of 36 pages as daintily bound and tied as a holiday publication, and no less tastefully printed and illustrated throughout. The writer goes back to the beginnings of the great fan-blower establishment of the B F. Sturtevant Co., of Boston, and traces its evolution to the stature of to-day. It is one of those stories that is only paralleled in the United States and that the next generation will only know as history, because its like will not then be represented in contemporary life. B. F. Sturtevant, a shoemaker, of Norridgewock, Me., got far enough away from his last to devise a machine that would cut shoe pegs from a strip of wood and drive them home in the shoe. A buffing wheel for smoothing soles was next brought out, and then came the exhaust fan to draw away the annoying dust produced by this machine. Then the applications of the exhaust fan widened, and without going into detail, the Sturtevant establishment of to-day and the manifold installations of the fan-blower in connection with forge, boiler, and cupola fires are the result. The Sturtevant horizontal engine, later the double-cylinder upright engine, and the Sturtevant steam hot blast apparatus for heating and ventilating buildings represent other fields in which the business has extended. The growth of the works to their present stature, and the development of the selling organization of the company are explained in the booklet before us, the style of which is most engaging and attractive. It is certain to have a wide reading.

A special list of second hand tools is issued by the U. Baird Machinery Co., Pittsburg, under date of Jan. 15. The lines chiefly represented are engine lathes, screw machines, speed lathes, iron planers, shapers, milling machines, punches and shears, wood-working machinery and blowers.

Vol. 1, No. 1, of the *Digest of Physical Tests and Laboratory Practices* has been issued by Frederick A. Riehle, Philadelphia. It is to be issued quarterly, and is a resume of the physical tests made in the laboratories of the world. This initial number has several original articles, besides a number taken from current technical literature, giving, with illustrations, the results of tests of mortar, iron and steel, cement, steel balls, leather belting, car wheels, cast iron, etc. The *Digest* promises to be exceedingly valuable to engineers.

The Tribune Almanac for 1896 has just been issued. Whether it be politics, religion, finance, commerce, population—or any of the lines covered by its statistical tables—the Tribune Almanac is exact. It is honest and non-partisan, and the fullness and accuracy of its information make it indispensable.

Great Pig Iron Record for 1895.

The complete returns of pig iron production in the United States in 1895, have been compiled by General Manager James M. Swank, of the American Iron and Steel Association, and are published in the current issue of the *Bulletin*, from which the statements and tables below are taken.

The total production of pig iron in 1895 was the largest in our ironmaking history, amounting to 9,446,308 gross tons, against, 6,657,388 tons in 1894, 7,124,502 tons in 1893, 9,157,000 tons in 1892, 8,279,870 tons in 1891, and 9,202,703 tons in 1890. The production in 1895 was 2,788,920 tons, or nearly 42 per cent more than in 1894, and 243,605 tons more than in 1890, when our largest previous production was attained. The production of pig iron by half years during the last four years has been as follows, in gross tons:

Periods.	1892.	1893.	1894.	1895.
First half	4,769,683	4,562,918	2,717,983	4,087,558
Second half	4,387,317	2,561,584	3,939,425	5,358,750
Total	9,157,000	7,124,502	6,657,388	9,446,308

All the large pig iron producing States shared in the greatly increased production in 1895 over 1894. As might be expected, the most notable increase was in Pennsylvania, which produced 4,701,163 tons, or 49.76 per cent of the total production, Allegheny county alone producing 2,054,585 tons, which was 590,796 tons more than the production of Ohio, more than double that of Illinois, and nearly two and a half times that of Alabama; and yet Ohio, Illinois, and Alabama made splendid records in 1895 as compared with 1894. Allegheny county made 43.7 per cent of the total production of Pennsylvania in 1895. The Shenango and Mahoning valleys also made remarkably large gains.

TOTAL PRODUCTION OF PIG IRON.

States.	Blast Furnaces. In blast June 30, '95	Blast Furnaces. Dec. 31, 1895 In.	Out	Total	Production. Gross tons of 2,240 lbs. (Includes spiegeleisen.) First half of 1895.	Second half of 1895.	Total for 1895.
Massachusetts	1	1	2	3	2,194	2,516	4,710
Connecticut	1	1	5	6	2,438	3,177	5,615
New York	3	6	16	22	88,369	93,333	181,702
New Jersey	4	4	8	12	28,112	27,390	55,502
Pennsylvania	80	103	76	179	2,087,381	2,613,782	4,701,163
Maryland	.....	1	8	9	.....	10,916	10,916
Virginia	10	17	11	28	142,580	204,009	346,589
North Carolina	.....	1	1	2	.....	323	323
Georgia	2	2	3	5	11,535	19,499	31,034
Alabama	20	22	29	51	390,553	464,114	854,667
Texas	1	1	3	4	2,502	2,180	4,682
West Virginia	2	3	1	4	62,567	79,401	141,968
Kentucky	3	4	5	9	19,283	44,495	63,781
Tennessee	7	8	13	21	114,169	133,960	248,129
Ohio	33	40	23	63	632,571	831,218	1,463,789
Indiana	.....	.....	2	2	.....	.....	.....
Illinois	11	15	2	17	376,401	629,690	1,006,091
Michigan	3	6	9	15	45,868	45,354	91,222
Wisconsin	3	5	1	6	53,720	94,650	148,370
Minnesota	.....	.....	1	1	.....	.....	.....
Missouri	1	1	3	4	2,267	25,251	27,518
Colorado	1	1	2	3	25,016	33,492	58,508
Oregon	.....	.....	1	1	.....	.....	.....
Washington	.....	.....	1	1	.....	.....	.....
Total 1895	186	242	226	468	4,087,558	5,358,750	9,446,308
Total 1894	108	185	326	511	2,717,983	3,939,425	6,657,388

Production according to fuel in 1895, as shown in the table below, together with stocks according to fuel at the end of the four half-year periods terminating June 30, 1894, Dec. 31, 1894, June 30, 1895, and Dec. 31, 1895:

STOCKS AND PRODUCTION ACCORDING TO FUEL.

Fuel.	Stocks. Gross tons of 2,240 lbs. June 30, 1894.	Dec. 31, 1894	June 30, 1895.	Dec. 31, 1895.	Production. Gross tons of 2,240 lbs. (Includes spiegeleisen.) First half of 1895.	Second half of 1895.	Total for 1895.
Bituminous	165,187	227,907	129,796	193,363	3,497,078	4,452,990	7,950,068
Anthracite	122,144	119,598	109,007	115,936	487,479	783,420	1,270,899
Charcoal	229,705	250,183	200,687	135,033	103,001	122,340	225,341
Total	517,036	597,688	439,290	444,332	4,087,558	5,358,750	9,446,308

Stocks of pig iron which were unsold in the hands of manufacturers or their agents on Dec. 31, 1893, and which were not intended for their own consumption, amounted to 662,068 gross tons. The above table shows that on June 30, 1894, they had fallen to 517,036 tons; on Dec. 31, 1894, they had risen to 597,688 tons; on June 30, 1895, they had fallen to 439,290 tons; and on Dec. 31, 1895, they amounted to 444,332 tons, a very slight increase over the unsold stocks on June 30, 1895. These statistics of unsold stocks of pig iron do not include pig iron sold and not removed from the furnace bank, nor pig iron manufactured by rolling mill proprietors for their own use. The distribution of unsold stocks at the end of the four six-months periods is shown in this table:

TOTAL STOCKS OF UNSOLD PIG IRON.

States.	Gross tons of 2,240 lbs. June 30, 1894.	Dec. 31, 1894.	June 30, 1895	Dec. 31, 1895
New England	15,387	12,019	11,172	9,058
New York	35,033	36,705	33,373	30,771
New Jersey	15,659	11,291	7,289	9,402
Pennsylvania	118,398	188,217	126,536	159,758
Maryland	3,703	4,459	2,414	1,674
Virginia	62,110	46,779	41,520	33,236
North Carolina, Georgia and Texas	18,868	21,554	20,629	18,953
Alabama	70,261	78,130	50,969	67,070
Kentucky	9,263	5,972	8,721	6,886
Tennessee	22,982	17,853	11,234	9,279
Ohio	43,198	66,046	53,386	49,160
Michigan, Indiana and Minnesota	51,411	74,672	56,370	23,040
Illinois and Wisconsin	17,639	7,843	6,473	14,119
Missouri and Colorado	20,824	30,948	20,770	10,767
Pacific States	1,300	1,200	1,200	1,200
Total	517,036	597,688	439,290	444,332

Although the aggregate quantity of unsold pig iron on Dec. 31, 1895, was virtually the same as on June 30, 1895, the above table shows that there have been some notable changes in the distribution of unsold stocks. There has been a decrease in charcoal stocks from 200,687 tons to 135,033 tons, Alabama and Michigan sharing largely in the decrease. On Dec. 31, 1894, the charcoal stocks amounted to 250,183 tons. They are now much smaller than they have been for a number of years. There has been an increase in bituminous stocks from 129,596 tons on June 30, 1895, to 193,363 tons on Dec. 31, 1895, chiefly in Alabama and in the Shenango and Mahoning valleys. The small quantity of all unsold stocks at the close of 1895 is remarkable. It was only 4.7 per cent of the year's total production, and represents about fifteen days' production of the active furnaces on Dec. 31.

In addition to the stocks of pig iron above noted as unsold on Dec. 31, 1895, there should be added 61,800 tons in the yards of the American Pig Iron Storage Warrant Co. which had passed out of the hands of the makers.

The production of Bessemer pig iron in 1895, was 5,623,695 tons, against 3,808,567 tons in 1894, an increase of 1,815,128 tons. The great increase in the total production of pig iron in 1895 over 1894 was largely caused by the extraordinary demand for Bessemer pig iron, which demand was in turn chiefly caused by the extraordinary demand for structural steel.

PRODUCTION OF BESSEMER PIG IRON.

States.	First half of 1895.	Second half of 1895.	Total for 1895.
New York	6,473	5,465	11,938
Pennsylvania	1,530,410	1,900,470	3,430,880
Maryland	.....	10,916	10,916
West Virginia	62,567	79,401	141,968
Kentucky	.....	10,000	10,000
North Carolina	.....	323	323
Ohio	446,754	584,981	1,031,735
Illinois	325,968	559,776	885,744
Michigan	1,789	.....	1,789
Wisconsin	4,027	12,952	16,979
Missouri	697	25,251	25,938
Colorado	23,348	32,137	55,485
Total	2,402,023	3,221,672	5,623,695

PRODUCTION OF BESSEMER PIG IRON IN PENNSYLVANIA AND OHIO DISTRICTS.

Pennsylvania.	Lehigh Valley	46,758	93,735	140,493
	Schuylkill Valley	26,134	59,738	85,872
	Upper Susquehanna Valley	38,199	55,031	93,230
	Lower Susquehanna Valley	151,948	227,804	379,752
	Juniata Valley	.....	.....	.....
	Shenango Valley	312,696	371,929	684,625
	Allegheny County	813,003	912,598	1,725,601
	Miscellaneous bituminous	141,672	179,635	321,307
	Mahoning Valley and Hang. Rock b.t.	185,541	177,315	362,856
	Hocking Valley	9,041	20,190	29,231
Ohio.	Lake Counties	110,563	167,857	278,420
	Miscellaneous bituminous	141,609	219,619	361,228

In 1893, the total of Bessemer pig was 3,568,598 tons; in 1892, 4,444,041 tons (the greatest record preceding 1895); in 1891, 3,472,190 tons, and in 1890, 4,092,343 tons.

ON WASTES AND SHOP HANDLING.*

BY JOHN RICHARDS.

By waste is meant what is cut away by cold shaping by oxidation, and other losses, also in molding; is the difference, so to speak, between the stock-room and warehouse weights.

The wastes in wood, iron and steel are between ten and twenty per cent. in machine construction, when there are fitted and finished parts, but as estimating is usually done on gross weights, or should be so done, there are no allowances except for spoiled or broken parts. By no allowance is meant special allowance, because in estimating, the weight of a shaft for example, the contour or rough dimensions are assumed, but if the shaft is ten feet long, and if the bar from which it must be cut is twelve feet long, there is a waste of one-sixth, less the scrap value of what is cut off. The piece may be used for some other purpose, but it must be stored, remembered and probably cut again. To weld such pieces will probably cost the difference between their value in a bar and as scrap, so it is waste at any rate, and should be so regarded.

These remarks, which are only in illustration, are preliminary to suggesting that in estimating for common machinery there should be added about five per cent. for the waste of material, counting from prepared castings, from metal in bars, and other material in corresponding condition.

The methods of arriving at the amount of material consumed in work are various. A common one is to weigh in all kinds of material as it is used; another is to weigh the completed work, add for waste, and then make up separately the brass, screws, lineal metal and so on, and deduct these to find the weight of frames, but on the whole it may be doubted if any rules that could be given here will have much value. The matter should be left to the judgment and ingenuity of each person to work out in his own way. One thing, however, may be noticed, that is the method of computing weights, or rather the "habit" of computing weights, because the method is a kind of mental mensuration that enables one to guess very closely the weight of a structure of any kind.

In England this work of taking out weights has become a special calling, done by what are called "quantity clerks," who become so expert by the use of rules, tables, implements and memory that weights are arrived at with great rapidity; so also other things, such as the amount of work involved, computed from the surfaces turned, bored, planed or finished, the number of screws, nuts, tapped holes, rough drilling, and so on.

I was present some years ago when Prof. Hesse, of the University of California, was called in to examine the armature of one of the first alternating dynamos sent to this coast, which went to pieces, cutting off beams, going through walls, and smashing various things in the plane of its rotation. The parts were hunted up as far as possible, some of them being found in an adjoining enclosure across the street. The manager of the works proposed to weigh them, but Prof. Hesse said: "That is useless, the weights arise out of dimensions, and will be found easier in that way."

A good way to manage for rough weights is to have castings and forgings weighed and marked as they leave the smith shop and foundry, and the weights charged to the work in process. This is essential in a works where the labor is performed under a contract system, because the machine-shop weights must correspond to the foundry weights, which are paid for by the ton, divided into classes.

In the management of a works of any kind the principal thing about materials is to have them at hand ready. It is hard to impress any one, not experienced, with the importance of this, and it would be incredible if there was some way of showing the losses that actually occur from a failure to have material and stores ready when required. In a shop experience of some years on this Coast, this of all things caused the greatest annoyance. Perhaps some account of this will offer a suggestion.

It was at first a daily if not an hourly occurrence for the tool and store keeper to report: "We are out of half-inch washers; there is no emery cloth; the 12-inch bastard files are out; there is no waste; certain sizes of tool steel are all used up," and so on. Inquiry and scolding did no good. The thing went on with considerable loss each day, and was clearly a fault of management. The store keeper, who was a very conscientious man, came in one day to report that some stores were wanting. "Go and procure them," was the instruction, "and mark off your time card, now and in future, all the time, down to minutes that you spend in going after things in working hours, and as soon as your cards are clear of such charges your wages can be raised, because of the saving effected in the shop." The entries for lost time soon disappeared.

* * * General rules that apply to the arrangement of factories and workshops are not many, as may be inferred from the extreme diversity that exists, but such rules as do apply have no attention to speak of, and it would be hard to name any other thing that is so much lacking in uniformity and design as buildings for industrial purposes. Diversity is not to be wondered at, but there is at this day some approach to uniform plans for machine fitting shops, that had its origin in England, so far as I know, that of an open central gantry, spanned by overhead traversing cranes, and stages at the sides occupied by machines and fitting conveniences.

Omitting architecture, the strength of buildings and their foundations, the beginning part in planning a works is the handling of material and the completed product, also material during the successive stages of conversion. This is the foundation, so to speak, that must always in a considerable degree affect an expense account and also determine the amount of room required.

Handling is of two kinds, horizontal and vertical, and it will be new no doubt to claim that vertical handling is not only more convenient but much less expensive than horizontal handling. As an example, the ore from deep mines is raised at the rate of two to three thousand feet per minute, and in some exceptional cases at a rate of four thousand feet a minute, or a speed exceeding that of common railway trains. Now we all know that material cannot be moved at this rate horizontally, or at less than three times as much expense is loading and discharging are included, and the same thing applies, but in less degree, in a machine works or factory of any kind.

This fact has become so apparent, in England especially, where room is restricted, that there is but little horizontal moving of machines or material in a works, and the effect of this is much wider than will at first be supposed. For example, whenever material or work has to be moved horizontally on floors, there must be a clear path for such movement, and it is found that in fitting and erecting shops the amount of work produced on a given area can be twice as much as can be done on the same area if the work has to be moved on floors horizontally.

I have in mind now a works in Salford, Eng., where the erecting floor is nearly impassible, and where there are left only narrow passages for the workmen to get out and in. If a machine is to be moved it is lifted vertically over the top of whatever lies in the way, moved to its new position and lowered. If a piece is wanted of a weight exceeding what one man can conveniently carry, the crane attendant is signalled, and he does the handling, not only bringing the piece to where it is wanted, but placing while in suspension.

This matter once made a great impression on my mind at the works referred to. I was being shown over the place by one of the owners, with whom I was well acquainted, and when when midway on the erecting floor, where we had made our way with much difficulty, he stopped at the end of a planing machine that stood under the gantry and said: "Now I will show you how we handle things here." He signalled the crane man, toward the cleaning room between the shop and foundry, who came instantly overhead for orders. "Bring top carriage, No. 3, Order 400," said he, and in less than two minutes the piece was overhead descending in front of us, and was laid gently on the planing machine bed, a saddle that weighed several hundred pounds. "Hold on," said he, "we will not want it at present; you may return it," and away it went again, sailing through the air, no one noticing or regarding the matter except ourselves and the man on the crane.

The overhead cranes were moving continuously from place to place, picking up and placing pieces, from a hundred pounds to thousands. This was at the Gresley Iron Works,

*Extracts from recent lectures before the students of Leland Stanford Junior University, Palo Alto, Cal.

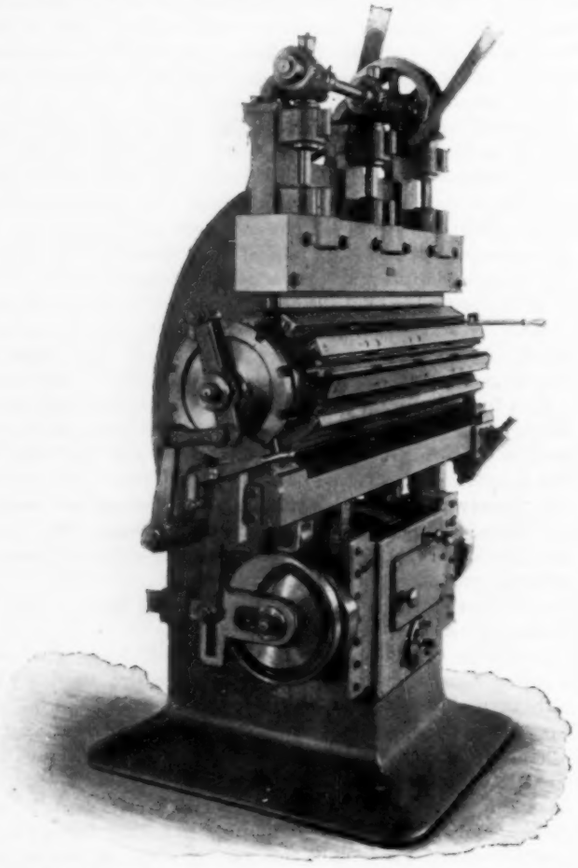
at present extended and rearranged, but no doubt just as condensed now as then.

In these works, it may be remarked, were kept the most accurate system of accounts and records that I have ever known in any machine works. The work made is machine tools of a high class, and by a mental estimate made at the time, 20 years ago, and by comparison with the machine tool works in Philadelphia, the floor space occupied for a given number of men and product was not half as much as in Philadelphia.

The main factor in this was vertical handling, and it is easy to imagine the effect by comparing with a works provided with elevators, but not cranes. The moving of anything on the floors is a difficult matter until an elevator is reached, then all difficulty is ended, except loading on the platform, and this must be included in the horizontal part, because with overhead traversing tackle no loading has to be done.

MULTIPLE SPINDLE DRILLING MACHINE.

The accompanying cut represents a multiple spindle drilling machine, built by the Langelier Mfg. Co., of Providence, R. I. This machine was built for the Pettee Machine Works, of Newton Upper Falls, and is attracting considerable notice. It



is used for drilling the flats for revolving flat cards; the pieces being of cast iron of T shape section, 3 ft. 6⅛ in. long by 1⅜ wide and ¼ in. thick. Along each edge of the base 81 holes are drilled, ½-inch center to center, 1-10-in. diameter. The 162 holes are all drilled simultaneously and automatically. The spindles are in two rows, and have their upper extremities cranked and driven by wrist plates that are actuated by the three vertical shafts, which are driven by bevel gears, from the horizontal shaft. There are three of these wrist plates, and as the holes drilled are small, and the speed high, (1,200 revolutions), they are accurately counter-balanced. The work is fed upward by means of cams, with a roller resting upon its upper surface, there being a duplicate cam and roller at the other side. In place of the usual platen, a cylinder is mounted in bearings, this cylinder having 10 longitudinal grooves formed in it, for the reception of the pieces to be drilled. The indexing is done automatically, and the operator's work consists in inserting the pieces and moving a lever, which fastens them in place. They are automatically released and thrown off.

The indexing is done as follows: At the left of the machine and upon the same shaft with the cams that do the feeding, is a grooved-face cam, which moves the slide forward and quickly returns it, while the table carrying the cylinder is down, and the drills clear of the work. The motion of the slide is communicated through a lever and link to the rocket arm with its pawl. The locking bolt is forced upward by a spring, which rigidly holds the cylinder in position during the drilling. It is pushed down by the lower end of the rocket arm as the pawl is moved towards the front of the machine to index another notch. The lock bolt being out at this point, the pawl pushes the index wheel around, the lock bolt being now forced against the face of the wheel by its spring, slips into the next notch, and the rocket arm stops until another flat is drilled. There is a handle to pull out the lock bolt when it is required to turn the cylinder by hand, but in running the machine continuously, it is not used. The clamping device action is as follows: While a flat is being drilled a new one is placed in the empty groove in front of it, and the clamping bar is forced from right to left by the lever. The wedges are forced tightly against the jaws the motion of the bars being sufficient to compress the springs, so that each wedge is tight, even though the flats vary somewhat in width. The flats are held tightly till they get to the bottom of the cylinder, then the end of the clamping bar strikes the fixed arm. As the cylinder revolves and is forced to the right, the wedges are pushed and the flats fall off on the front of the table. The feed motion is driven from a small pulley on a horizontal shaft at the top and by bevel gearing is transmitted to the cam shaft in the base, the knob being connected to a clutch by which the feed is thrown in and out. This shaft can also be rotated by a hand wheel, which fits a square shaft projecting from the front of the base of the machine.

Such a machine is not regularly manufactured, but is shown as an interesting example of a special machine design. The Langelier Mfg. Co. also build multiple drilling machines for a great variety of work; having built machines in addition to the one above described, for electrical work on wood, fibre or metal for bicycle hubs, guns, swedging machine work, clock frames, locks, hinges and other hardware, Jacquard loam work perforated metal and brush and novelty work of various kinds.

Testimony Concerning Empire Boiler Cleaner.

From J. C. Thompson, superintendent of the blast furnace of the Mahoning Valley Iron Co., Youngstown, O., the Empire Boiler Cleaning Co., New York, through its Cleveland manager, Alex. C. Bates, has the following letter telling of the furnace company's experience with the Empire compound: "Our furnace has been out of blast since Jan. 5, but we will state that your compound has fully come up to our expectation for the time we have been using it. It is by far the best compound that we have ever used." Recent orders from Central territory taken by the Empire Boiler Cleaning Co. are from the following prominent plants: The Columbus Central Railway Co., Columbus, O.; the Falcon Iron & Nail Co., Niles, O.; the Indiana Iron Co., Muncie, Ind.; the Muncie Belt Railroad Co., Muncie, Ind.; the Cerealine Mfg. Co., Indianapolis, Ind.; the B. F. Goodrich Co., Akron, O.; the Youngstown City Water Works, Youngstown, O.

AT New York, the supreme court directed a verdict in favor of the plaintiff in a suit brought by the attorney general of the State of New York against the directors of the Central Stamping Co., to prevent that company from doing any further business. In December, 1884, five large firms of tinware manufacturers formed the company, putting $500,000 into it. Each concern leased its factory to the company for ten years. The effort to extend the arrangement 50 years is resisted by minority stockholders.

THE Atlanta Steel & Tin Plate Co., Atlanta, Ind., has changed its Chicago office from Crane & Co., Rookery Bldg., to 937 Monadnock Bldg., where it will be represented by Hubbert & Hubbert, iron and steel factors.

SAMUEL F. VINNEDGE has been appointed receiver for the Montpelier (Ind.) Sheet & Tin Plate Co. The works have been shut down the past month.

THE WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, January 15, 1896, at the Great Northern Hotel, Chicago. The president, Mr. John M. Sweeney occupied the chair.

Those present were the following: J. M. Sweeney, A. L. Bowen, Chicago Consolidated Iron & Steel Co., Harvey, Ill.; T. P. Gaddis, Dayton Malleable Iron Co., Dayton, O.; G. H. Carver, Plano Mfg. Co., West Pullman, Ill.; A. W. McArthur, Rockford Foundry Co., Rockford, Ill.; F. H. Lyon, Burlington Route Foundry, Aurora, Ill.; John Pettigrew; Illinois Steel Co., Joliet, Ill.; F. C. Patten, A. L. Wheeler, F. C. Patten Co., Sycamore, Ill.; J. Bowie, J. H. Dalton, Walburn-Swenson Co., Chicago Heights, Ill.; Jas. Marshall, E. W. Smith, Crane Co.; A. M. Thompson, Wm. Kuy, Link Belt Machinery Co.; Jas. Brady, G. C. Batten, Kurtz & Buhrer Foundry Co.; G. W. Scott, M. E., Sargent & Lundy; Jas. Fyfe, Pickands, Brown & Co.; A. Sorge, Jr., M. E.; R. C. Cantelou; H. S. Vrooman, Garden City Sand Co.; John Ramsay, Tarrant & Ramsay; E. E. Hanna, W. Ferguson, Gates Iron Works; H. L. Hotchkiss, F. G. Coffeen, Deering Harvester Co.; W. D. Mahaney, Jos. Dixon Crucible Co.; H. Ferguson; B. M. Gardner, *The Iron Trade Review;* W. T. Twomey, American Trading & Storage Co.; R. J. Cleveland, Cleveland & Barr; H. F. Frohman, J. E. Evans, S. Obermayer Co.; W. L. Lukens, Illinois Malleable Iron Co.; Leo R. Saloman, Chicago Architectural Iron Works; S. T. Johnston, Whiting Foundry Equipment Co.; all of Chicago.

The following were unanimovsly elected members of the Association: Wm. Bayley & Sons Co., Milwaukee, Wis.; Stockham Mfg. Co., Chicago; G. W. Scott, M. E., Chicago; W. D. Mahaney, Jos. Dixon Crucible Co., Chicago; Western Foundry Co., Chicago, and American Trading & Storage Co., Chicago.

The Chair announced that the meeting was open to the discussion of Mr. Dingey's paper on "The Care of Patterns and Pattern Account," which was read at the previous meeting.

Discussion on "Care of Patterns and Pattern Account."

Mr. Bowie: At the last meeting there seemed to be a little argument between two of the members about the value of patterns as an asset. I think this is a question in which there is room for a large range of opinion. As far as I can see it, one gentleman put the thing in such a way that, with slight qualifications, I could agree with him. He seemed to contend that the way to value a pattern was upon its productive quality. I think that if he would have qualified that by stating that the value of the pattern would be its productive value up to, but not exceeding, its original cost, that would be about right. I do not see how you can justly put any more value on a pattern than the cost of reproducing that pattern. I think some ought to have a larger value than that as curiosities. They have more than intrinsic value owing to their rarity. A pattern that is not likely to be required to be duplicated should have some value as an asset. This is the class that would be affected by difference of opinion. The pattern may lie in the store room for a year, for five years, before there is an opportunity to use it again. What is the worth of that pattern? That is what bothers the majority of people. I remember that when I was with a concern whose work was in connection with building store fronts, we estimated the cost of the patterns on a job and when the job was finished the cost of the patterns was sunk; but if we could use these patterns on another job we found a little more profit on that job. They never were entered as a live asset.

Discussion on Announced Topics.

The Secretary read the following topical questions, which were open to discussion by the members:

1. Does the employer derive any benefit from compelling molders to remain in the foundry until quitting time, if their molds have been poured off before? If so, what benefit?

2. Are there characteristic conditions in foundries which necessitate different practice and management from those followed in other industrial pursuits?

3. Is a molder in fit condition to do further work after he has poured off his day's molding?

4. Is it desirable to have a recognized apprenticeship system, and, if so, what is the best form?

On motion, duly seconded, it was decided to discuss only the first three questions before the four should be taken up.

The Secretary read the following written contributions to the discussion:

FROM THOS. D. WEST.

SHARPSVILLE, PA., January 7, 1896.

S. T. Johnston, Secretary W. F. A., Chicago, Ill.

DEAR SIR:—In replying to your request for answers to the four questions to be presented at the coming meeting, I would say to the first, "Yes," in cases where employers have found such a rule necessary. The benefits derived consist often in securing sufficient help to properly and safely pour off and shake out the "tail-ender's" work. In many respects it is but justice to the majority of the shop's crew, as the rule is one preventing partiality to employees, while it ensures good results in obtaining castings and lessens destruction to shop tools.

To the second query, I would answer "Decidedly so."

To the third, I am in answering carried back to my own days of journeymanship to recall my feelings, which I can describe as not being very enthusiastic to start molding after I had finished pouring off a day's, week's or month's work. There is seldom anything gained by compelling a molder who has molded seven or eight hours to start again after "pouring off" to fill time for ten hours' work. More is gained by inducing extra exertion before the "pouring off" and then, if he has had good success, let him rest on his laurels; if not, let him have the time to meditate on his misfortune and he will be the better able to start fresh his job the next morning to secure good work. After supper and half an hour's rest, a molder, in case of necessity, can do work much better than to start in right after pouring, without rest, as I take it to be the sense of the inquiry. Yours truly,

THOS. D. WEST.

FROM MARTIN FOX, PRESIDENT OF THE INTERNATIONAL IRON MOLDERS' UNION.

Gentlemen of the Western Foundrymen's Association:

I feel called upon to acknowledge your courtesy in inviting me to express my views upon subjects, which, though they may be said to be of minor importance in our general relations as employers and employees, are nevertheless full of the most vital interest to those who follow the trade of iron molding.

I feel that the fact of your inviting a representative of the other side to take part in the discussion is indicative of your desire to treat the subjects in a fair and impartial manner; that you are prepared to set aside any preconceived conclusions you may have arrived at, and, recognizing our mutual interest, by friendly discussion seek to harmonize our views and come to a decision founded upon wisdom and justice.

It is not my object to use this opportunity to intrude upon your notice subjects upon which, perhaps, our opinions may be more widely divergent; but I may be pardoned if I express the hope that the friendly spirit manifested by you upon this occasion will at no very distant date evolve a method of settling our differences, be they never so acute, alike more creditable to ourselves, more mindful of our interests, and more in harmony with the intelligence and enlightenment of our generation.

It is impossible, in a paper necessarily brief, to cover every point that could be advanced on the topics before us. From the differing conditions to be found in the various foundries of the country, I warn you at the outset that we can formulate no specific rules or regulations that would operate equally well in all.

The first three queries in your circular are so intimately related, that they might fairly be treated as sub-divisions of the one subject. For convenience sake I will start out with the question scheduled "2."

"Are there characteristic conditions in foundries which necessitate different practice and management from that followed in other industrial pursuits?"

Unhesitatingly I answer in the affirmative. Before an association composed of practical foundrymen thoroughly intimate with the working conditions in the foundry, it seems superfluous to go into any elaborate argument in defence of my

answer. Every one of you knows, every one of you in the administration of your business has observed, that the foundry stands out peculiar in its inherent conditions as compared with the other departments. A molder's workday is divided into two distinct sections, the first the preparatory, the second the completing, or perhaps, to be more technical, the "pouring off." In the first of these subdivisions the molder, generally speaking, may be said to be on equal terms with the machinist, the blacksmith, or the boiler maker, who at the blow of the whistle or ring of the bell can lay down his tools and go home. But there the similarity ceases. The second sub-division imposes conditions quite the reverse. In it the molder's work, if you will pardon a platitude, is done when it is done, uninfluenced by either bell or whistle. The elements, the fuel, the character of the work, the unforeseen, all combine to render a definite computation of time impossible. The molder, during cast-time is much like the hungry man in a busy restaurant, who may be consoled with the reflection that there is food in the kitchen, but must wait his turn to get it. He may be ready for his iron as soon as or before his neighbor, be may hungry for it, but he must await his turn as determined by his foreman. While these waiting ones can not be said to be working, it may be truthfully argued that—

"They also serve, who only stand and wait."

One word more: Did it ever occur to you that the molder's work of the previous day will oftentimes wield considerable influence over that of the present? Have you gone into your molding shop in the morning and gazed upon the hot and unsightly heaps of sand and castings that greet you? Have you noted the vicious hiss when water is applied? Have you noted the steam arising from the mold later in the day when the pattern has been withdrawn, or marked the beads of perspiration standing out on the forehead of the molder? Or, again, on a cold day, have you seen him on his knees on the damp, cold floor? Have you seen him vigorously flap his arms to restore the circulation and warmth to his benumbed fingers, or put on his vest to shield himself from the draught of the big sliding door? Have you looked on these evidences as united appeals to your kind consideration, and as serving to point out some difference of conditions from other departments?

But to resume our argument: The molder has got his iron iron and is ready to shake out. The temperature is rapidly rising and the air becoming polluted with gases and smoke. Vigorously he plies the sledge and frees the sand from his boxes, till at last he is finished and with palpitating heart and sweat oozing from every pore, he crawls to the yard, if it be summer time, for a breath of fresh air and a much needed rest; or if it be winter, gropes his way through the steam and smoke to the water tank for a dip into its welcome coolness. Look at him! Do you think him in a fit condition to do any further work? Frequently have I gone myself, after "pouring off," to the assistance of some unfortunate who was behind with his job, and been surprised at my uncertainty of touch, and nervous quivering hand, due to the great physical and mental strain to which my body had been so recently subjected. And as "a fellow-feeling makes us woudrous kind," I, together with those of you who are practical molders will assuredly support the contention that the exhausting, suffocating nature of the molder's final labors totally unfit him to do further work.

And now we come to the consideration of the third proposition as stated in question one, viz: "Does the employer derive any benefit from compelling molders to remain in the foundry until quitting time, if their molds have been poured off before?"

I feel that this is a question of considerable delicacy; that every shop may furnish a different set of premises from which to argue, and that one verdict must be dictated by common sense and humanity, and not by what seems to be legally right in the light of the "pound of flesh" doctrine as propounded by Shylock.

In the smaller shops where molders are required to pour for one another, to feed, or render such other mechanical assistance as the casting period requires, they as a rule will be fairly well employed till within a few minutes of quitting-time. In such instances, it seems to me picayunish on the part of an employer to insist on their detention in the shop.

In large, well-appointed shops we find these peculiarities of the molding shop more strongly accentuated. I know of shops in this country where some of the molders are often through with their work as early as half-past four. These of course are exceptional cases, but frequently I have found them poured off and finished an hour before quitting-time. To the live superintendent, ever watchful to stop all leaks in his establishment, this may be looked upon as an unpardonable waste, and the question naturally occurs to him: What can I give this man to do to make his time profitable for the firm? I said this was a natural question, but I should have qualified that statement by adding "on the part of the superintendent unacquainted with the peculiar conditions of the molding shop and the physical state of the molder as previously described." The competent foreman will endeavor as far as possible to avoid unnecessary waste of labor; but to arrange his blast so that every man will be fully engaged during cast-time and will be through with his work within a few minutes of the blow of the whistle is, from the nature of the case, an impossibility. There must therefore always be more or less enforced idleness among the men individually from the time the blast goes on till quitting-time. In some cases this idleness will be before pouring off, in others after. It is an idleness unavoidable, though non-productive. The former an idleness of expectancy, the latter of completion. In the first case the man *must* remain; in the second, why should he, unless his presence be required for the proper performance of the duties of the others? I am of the opinion that a firm having confidence in its foreman's ability to run its foundry to the best advantage, is profiting nothing by imposing restrictions of this kind on its molders when their day's work has been completed and there is no further need of their services. I have no sympathy for the man who, himself finished, selfishly goes off and leaves a fellow workman to struggle through short-handed, but I have sympathy for a man who is compelled to remain under such unfavorable conditions when his presence profits no one. I detest the shirk, and sometimes he may take advantage of a well-intentioned employer, but you have the remedy in your own hands. I present to you the principle, gentlemen, that when your interests are not being affected the comfort of your employee should be your first consideration.

In summing up my argument on this question I would submit that the most casual observation will serve to show that the practice and management applicable to other industrial pursuits cannot be successfully applied to the foundry, and that any system that may be devised for its government or control must be made to conform to the conditions therein found, and not the conditions to the system. That while there are periods of unavoidable and seemingly unprofitable idleness, it must be borne in mind that the men who are habitually poured off early in a large shop work during the earlier portion of the day at a greater rate of speed and a higher pressure than those who have to wait longer for their iron, and that, as has already been demonstrated, neither the shop conditions nor the physical state of the molder being conducive to productive labor no good purpose is served by the further detention of the man after the pouring off. Very truly,

MARTIN FOX.

FROM EUGENE W. SMITH.

To the Western Foundrymen's Association:

In answer to the questions presented by your committee, I respectfully submit the following:

(1) Yes, under certain conditions. I think it would be advisable to hold all help in foundry until the bottom is dropped, which should be considered as the proper time for quitting in foundry practice. One done, all done, *providing all help may be used in pouring off the work;* also, that the melting is done systematically, and where the melting should happen to overreach the regular quitting time it should be offset by the times in which the bottom had been dropped ahead of regular quitting time. The molder should be allowed to go home, providing all work had been poured off, and tools and places were left in proper condition to resume work without loss of time the next morning.

(2) The characteristics of foundry work are such that you may resume work at regular times, but circumstances interfere with a regular quitting time.

(3) I do not think he would be in fit condition to work at molding. Yours truly, EUGENE W. SMITH.

FROM A. SORGE, JR.

Questions 1, 2 and 3 are so closely related to each other that a discussion of one necessarily involves all three. It appears to me that the difficulties hinted at in these questions are all due to the fact that the great majority of foundries are to-day run on the same principles that prevailed in the old days when the guilds controlled the various crafts. Molders are expected to be competent and to perform all the details of work occurring in a foundry. The demands made upon them have increased very largely in numerous directions. In all other trades it has been found expedient to divide the work when the progress in the trade called for too great a diversity of skill in the individual. We so find that specialists in particular portions of each trade are the order of the day, except in foundries. True a partial division has gradually crept in even here, so that we now have stove-molders, bench-molders, loam-molders, etc., but these divisions still involve for each individual the skill and labor of tempering sand, molding, pouring off, shaking out, etc. It will be admitted that more and better work can be done by a workman whose thoughts and energies are directed continually to one end, than by one who is obliged to divide his attention and who attempts to become expert in numerous directions. The latter surely results in mediocre performance all around instead of pre-eminent excellence in any one direction. It therefore appears to me that the step which it is necessary to take in order to start the foundry trade in the direction of rapid progress is to relieve the molder of all work except molding. The molder, when he engages with an employer, impliedly contracts to work during the ordinary daily working time. It is, therefore, incumbent upon him to be prepared to fulfill this implied contract if called upon. On the other hand, under the present system of running foundries, the molder is ordinarily not in a fit condition for further work of value after he has poured off. Furthermore, he is frequently required to remain after the usual quitting time, and no remuneration is allowed him for this, in many cases. This condition of affairs naturally breeds discontent, either on the part of the employer, if the man finishes his work before the stipulated working time has expired, or on the part of the man, if this time is exceeded. These causes of discontent will be removed when the men know just the work and length of time of labor expected of them, and the employer realizes that he is obtaining full value for the pay rendered. In other words, the contract between employer and employes in the foundry will no longer be indefinite and implied, but will be accurately defined, when we employ molders for molding only, and have all other work, such as shaking out castings, tempering sand and pouring off, etc., performed by specialists who shall be trained to the particular work required of them. Not only will this lead to a better understanding between employer and employees, but the efficiency of the workmen who do the special work of any kind will be largely increased.

As matters are run now in the larger number of foundries, I do not think that molders are in a fit condition to do further work after having poured off a large day's work, and therefore I do not believe employers derive any benefit from keeping them after pouring off, unless on special occasions when they can assist their colleagues in completing the day's work. A competent foreman is the best judge of the necessity of a molder remaining.

The characteristic conditions now prevalent in foundries and which necessitate different practice and management from those followed in other industrial pursuits are due to the adherence to the old system of craftsmen who are expected to be competent in numerous directions. Divide the labor, and this falls away and puts foundry work in the line of modern advancement. As a first step towards this end, limit the molder's work to molding. A. SORGE, JR.

Oral Discussion—Practice Abroad.

Mr. Pettigrew: I spent my apprenticeship in the molding business in the old country. I never saw a time there that a man was required to work over 10 hours a day; at the same time he was required to be there the whole 10 hours. There was no bad feeling or trouble in that way. When I came to this country I was astonished to see some molders leave at two o'clock, at half-past two, and so on, and some kept until seven and eight o'clock. This occasioned bad feeling. The men that were kept late were jealous. As a general thing it would be the same molders that got away early all the time. I think it is a very bad practice all through to allow molders to go away so early in the day. Sometimes you will be looking around for a man to help pour off and you have to get a man from another part of the shop. This creates bad feeling.

Mr. Ferguson: I think that the whole cause of there having to be any reply made to a question of this kind is chargeable to the system, or lack of system, under which foundries have been running. It is just as unfair to ask the question, Does it profit the employer to keep his molders until 7 or 8 o'clock at night without paying for it? I believe that it is the system of give and take that has been to the detriment of the molder, the foundry and the proprietor. I believe that the only way to remedy it is to establish a certain number of hours for a day's work, and I do not recognize any extraordinary conditions in the foundry to prevent working regular hours, as well as in other departments. In order that justice should be done the molder, it is absolutely necessary to establish time for him to start and stop, and when he works beyond that time he should be paid for it as any other mechanic would be. The question whether it is profitable to the employer must be settled by the employer and foreman of the foundry. The other system is to the detriment of the employer from the fact that there are always in large shops molders working on jobs that were not begun that day, and if the system is such that some men leave the shop it will create a general indifference in the men that are working. If these men do not quit at five o'clock, they might as well, for all the work they will do thereafter. If all the men are kept until quitting time, these molders will continue without interruption.

Mr. Carver: It seems to me of all the remarks, the strongest point has been made by Mr. Sorge, in which he mentions the classification of labor as being the most satisfactory solution of the questions before us. It is true that there are different conditions—varying conditions—in foundries that require different treatment; but as a general rule the classification of labor, as hinted at by Mr. Sorge, having the molder do the molding, another set of men to do the pouring, another set to do the shaking out, etc., is perhaps productive of the best results. It seems to me that a great deal can be accomplished by proper management on the part of the superintendent of the foundry in arranging for the hours in which the blast should be on, the size of the furnace for pouring a sufficient amount of iron in the smallest amount of time, etc., all of which will assist the molder if he is pouring off his own floor as much as if he was preparing for the next day's work. It is true, of course, that you cannot give to all molders in the shop iron from the last ladle, but by arranging a rotation in which the iron is distributed to the different parts of the shop, you can, by a judicious management on the part of the foreman, prevent hard feeling on the part of any set of men for getting off later at night than others.

Referring to the classification of labor, it seems to me that this idea is one that is bringing American machinery into the markets of the civilized world. While visiting one of the large iron works in England, just after Mr. Hanna, of the Atlas Engine Works, had been there, the superintendent told me that he had been offered by Mr. Hanna an electrical plant cheaper than it could be produced by them. He said it was because of the classification of labor, one man doing a certain portion and one another, and so on. The classification of labor was carried to the extreme in the building of the plant, and thus the work could be done very cheap. They take so many pieces. Each man has his own particular work, some other man takes it up and carries it further, and so on. In that way they are able to compete in the markets of the world for the sale of their product.

In relation to the third question I fully agree with the general sentiment that the molder after he has done his day's work, poured out his floor, shaken out his sand, got his pattern into shape for the next day's work, should not be expected to do any more and should be allowed to leave.

Jobbing Shops and Division of Labor.

Mr. Thompson: I think we are inclined to look at these questions according to the kind of work we are doing. The division of labor might be a very good thing in some shops

but would not be a good thing in a jobbing shop. It would be hard for the foreman to tell who was responsible for the castings sometimes. I do not think it would be possible to educate laboring men to pour off work satisfactorily. Another thing, sometimes difficulties occur in the shop in one department. Coremakers are sometimes dissatisfied and go on a strike and that means the shutting up of the shop. I think the benefits which the foundry gets is derived from proper facilities and good management. There is, generally understood, no such thing as quitting time in the foundry. An arrangement has been made so that an employer having a large heat with poor facilities may make up the difference by keeping his men late, allowing so many to go as soon as they have poured and so many to remain after and for that there is neither deduction in wages nor over-time pay. A foundryman having first-class equipment and trying to get through by quitting time finds himself in competition confronted by another foundryman who has very poor equipment, less business expenses and yet is able to underbid him in making castings by making up the difference in keeping his men late. I think if all foundrymen would work under the same rules, there would be a stipulated quitting time and the business would receive proper management.

Mr. Sorge: In the remarks just made by Mr. Thompson he states that he does not believe that laborers can be educated to do the pouring of castings. As far as any remarks of mine were concerned, I do not limit the education to any man, whether he be a laborer or a molder. I think that a man that is specially trained to pouring will pour better than a man that pours once in a while. I think that a man whose attention is centered in one direction, if he is a man of equal intelligence with a man whose attention is turned in two directions, will do his work in better order and is more competent to judge of difficulties to be overcome, than the man who is pouring and casting. Simply taking a common laborer off the floor and have him pour castings is not the idea I desired to convey.

Mr. Thompson: The pouring off is only a small fraction of the day's work and if you take a man to do this work you pay him higher wages and during the greater part of the day you can not properly employ him. I do not think foundrymen would receive any benefits by a system of that kind.

Mr. Sorge: I would like to ask Mr. Thompson, what is to hinder us from pouring iron ten hours a day instead of two hours?

Mr. Thompson: There is nothing to hinder us, but it is not always practicable to do it.

Mr. Sweeney: This point is one that I am very desirous of having raised, but not quite in the manner that it is being raised. The matter is covered to some extent by a suggestion in Mr. Thompson's first remarks in which he said that individual cases govern in these matters. The question which has arisen in my mind is not of an individual method which may be applicable to one foundry and not to another, but whether a man who has made a mold is not better qualified to pour off than a man who has no knowledge of the other things that apply.

Mr. Sorge: I want to take issue with Mr. Sweeney's statement that the man who makes a specialty of pouring molds cannot familiarize himself as thoroughly with the requirements of a particular mold as the man who makes this mold. I believe an intelligent man, educated and trained for the purpose of pouring these molds, will take account of all the conditions involved in the molds as well as the molder who makes them. Furthermore, I claim that this man will be a better judge of the condition of the iron, the manner of manipulating the iron and the method by which he makes it enter the mold, than the man who has to cut up the sand.

Mr. Sweeney: I do not understand that I made such a statement. The question is whether the trained pourer can pour the mold better than the man who made it. It only occurred to me that this was a question where an interchange of opinion would lead to some good results.

Mr. Vrooman: I agree with Mr. Thompson in this matter. I think there is no molder who does not believe he can pour his mold better than anybody else. A mold that has been poured by somebody else than the man who made it will spring 99 times out of 100. You could not educate a man to handle that work like the man who put it up, who knows where it is hard and where it is soft.

Mr. Ferguson: After a few years' experience with custom molders I must agree with Mr. Sorge that it is possible to train men to do the casting in many cases better than the molder would do it. I can refer to Mr. Thompson and Mr. Ramsey to bear me out that if they leave the molders themselves to their own judgment, without supervision and direction, the percentage of loss at all times is greater.

Mr. Pettigrew: Allow me to go back to the old times again. I remember in several shops in Glasgow that the assistant foreman would not allow the molders to pour the mold. He considered he was a better judge than the molders. I think this is in the same line that Mr. Sorge suggested. It will save lots of cold shuts.

Mr. McArthur: I take it that Mr. Sorge did not mean that the man who pours off molds should pour off only large molds. It seems to me that there are only two ways in which that can be done. You must have as many pourers as molders, or you must pour iron all day. It seems to me it would be a great disadvantage to have a force of molders working when the pouring is going on. In regard to having one man pour off large molds, I think it is an excellent idea. I do not see why a laborer of good capabilities could not be trained to do it.

Mr. Dalton: I believe with Mr. Sorge it is better to have the sand cut and everything ready for the molder when he goes to the shop. I also agree with him about the pouring-off, provided you break in men that are capable of pouring-off. Having everything ready to do a day's work makes it very much easier for the molder and he can accomplish much more and accomplish it better.

Mr. Pettigrew: I do not think it pays an employer very well for a man that is getting $2.50 and $3 a day to shovel sand for an hour in the morning. I think that if foundry business was looked after carefully the sand would all be cut up and the molder ready to go to work in the morning.

Would Have the Molder Pour.

Mr. Ramsay: I do not think it is practical to have a different man do the pouring-off. Besides the man who makes the molds knows best about pouring off. Then what are you going to do with these men when they are not pouring-off iron? You would have to increase their wages. The foundries in Illinois are not large shops. There are lots of little shops. Perhaps the small shops altogether melt as much iron as the large ones. The molders have to pour-off their own work, the apprentice boy has to learn to skim and the foreman has to be around most of the time. He has to use his judgment. The molder necessarily relies upon him for that.

Regarding Mr. Pettigrew's statement that he thought it a bad idea when he came from the old country, to find the molders quit after pouring-off: I served my time in the old country, and thought the American way was the better plan. I think it is the best system that can be adopted in America. Of course there are cases when it does not seem for the best; molders will go away and not help their partners. I believe the best results will come from doing just as we are doing to-day.

Mr. Fox's paper was in the interest of elevating molders. The molder should be anxious to work for his own interests and his master's in pouring his work. If we take the pouring away from him, we will take his individuality away from him. All molders take pride in pouring their work. If I make a mold I like to pour it. You can train a man to do pouring, but the man that started in at the bottom, secured the mold, fastened it and knows where everything lies, will certainly do the best pouring.

Mr. Gaddis: I think all these matters under discussion are individual cases. Each shop has to work its own problem. No general rule that may be discussed here would be applicable to an individual case. All the talk here to-night has been about cupola practice, whereas it does not apply to reverberatory practice. I do not think that we can lay down rules or formulate plans to apply to all shops. To do a day's work I think the molder should pour it off. The molder's labor with me means molding and pouring.

Mr. Ramsay: After a casting has been poured it needs a man of good experience to know how to cool it. Are you go-

ing to raise men specially for that thing? The molder is the one man that can be left in charge. This man that you have pouring would not take any pride in it. There is not a conscientious molder that does a piece of work but wants to see it come out right. Would the man you have hired to do the pouring have any interest in it? Not at all.

Mr. Brady: I partially agree with Mr. Sorge and partially with Mr. Ramsay. I think in the first place if you get a special man to pour off you make a divided responsibility. The molder will say, he made it all right, and the man who poured off will say that he poured it all right. I believe the molder should do nothing but molding and pouring, but in most of our shops the molder cuts the sand, shakes it out and does a lot of work he should not do. I believe that men at night should shake out the flasks and have the sand cut over for the molder ready to go to work at seven o'clock in the morning. I believe in regular hours. I am always anxious to get home myself, and I believe 10 hours is long enough for the foundry. I aim to have the bottom drop at 5:30 every evening. But, of course, molders are human and they make a great many mistakes themselves. If we let them go early they will stand around the shop for an hour or so. This having men come and cut up the sand is adding to the cost, and will your molder do any more work than if you allow him to come in and cut up his own sand? That is a question I have tried to settle for a long time. Sometimes I think the molders do and sometimes I think they do not. The practice is to have the sand cut twice and then let the molder cut it again in the morning. There is not much made out of it. If we could adopt a general rule of that kind among foundrymen and have it universal, we could get some benefit from it.

Mr. Ramsay: Some shops have put in night gangs and got ready for the molder to start at seven o'clock, but it was found quite impractical. You cannot train any man to prepare the sand as the molder will, and if anything is wrong with the casting the molder will hold up his hands and say the sand was too wet. I remember a practical foundryman who struck a noble idea. He had a hose and sprinkler and laid pipes and was going to carry the water to the sand and be all ready for the molder. He had the greatest mess you ever saw, and he found that it was not practical and stopped it and let the molder cut his sand.

Mr. Hotchkiss: I believe it is possible to have sand tempered by laboring men; and also believe it is practical to have the molds poured by men who have been trained for that purpose, for the reason that I have seen it demonstrated to my satisfaction. In regard to the questions under consideration, it seems to be the general impression, as foundries are conducted, that there is but one answer. It does not pay to have molders remain after their day's work is poured off.

In regard to the second question I agree with Mr. Sorge; I think it is practical to divide the work in certain foundries. Of course, this depends upon the class of work. In large shops, it is possible to have a great deal of the work poured by common laborers and it is being done at the present time. In regard to the increased output of the foundry: If the molder works from morning to night at molding, which he can do, and his work is poured by another set of men, the output of the foundry is increased at least a quarter and perhaps a third.

Practice Must Vary With the Shop.

Mr. Hanna: I think that Mr. McArthur and the last speaker got down to the bed rock of the question. Mr. McArthur said that he could formulate no rule or arrangement for all shops, but that each shop had to work out its own salvation. It would be very easy for us to describe the ideal shop and the ideal conditions wherein all labor could be classified. The molder would work 10 hours a day at molding; cheaper men would do the manual labor of pouring off; all the sand would be tempered, run into a conveyor, from that to an eleva or and from the elevator to bins overhead, and in the morning, all the molder would have to do would be to open the spout and get his sand. The castings would be out of the shop and out of the way. But this would not apply to nine-tenths of our foundries to-day.

As the shops are run to-day, there is no use of keeping the molder after his molds are poured, for, if he pours them himself, he is not in a condition to be of any benefit to any one. That of course, answers the third question.

The second question requires no discussion. There are a great many conditions in foundries which do not apply to any other business. Yet the idea that we cannot start in the morning and pour all day and have the men work to advantage, seems to me would be disproved by several foundries that are doing it. I understand that the Deering Harvester Co. starts to pour at nine o'clock and continues until six. The act that other men besides the molder not only temper the sand but even close loam molds, would disprove the assertion that it cannot be done. The loam floor foreman of the Allis Works told me that, in the majority of cases, the loam molder never saw his work after it went to the oven, that it was poured and closed by experts under the supervision of the foreman. My idea of the question of pouring would be that with proper facilities for getting the iron around the shop, laborers could do the manual work under the supervision of the superintendent. He knows, probably as well as the molder, how the mold is built, knows the arrangement of all the cores and projections; and the fact that he is foreman would naturally suggest that he has better judgment about such things than the molder.

Mr. Sorge remarked that we should pour all day. There are very few shops that mold enough iron to do this. One crew of men could probably handle ten tons an hour, and that would mean one hundred tons a day. There are very few shops that pour this amount. He says that the man that pours would be as familiar with the molds as the man who makes them. If he is pouring 10 hours a day he would have to be very busy to be pouring and watching the molds at the same time.

The next question is whether a molder should work 10 hours a day and be paid for 10 hours, or work less and be paid for less. There seems to me to be but one answer to this question. Pay a man for what he does. If he works for 11 hours pay him for 11 hours; if he works for nine hours pay him for nine hours. The idea of give and take will make lots of trouble. To pay a man for exactly what he does seems to me to be the only fair and proper way for both parties.

Mr. Patten: It seems to me it is rather expensive to have a molder cut over his sand; but it does not seem to me that it would pay wonderfully well to have other men do it. Another crew would cost nearly as much as the molders and we would not get twenty-five or thirty per cent. more work out of them.

Mr. Cleveland: I think every man knows how to pour his own mold the best. In some shops they could pour all day and in others not. It depends upon the class of work being done.

A Case of Expensive Continuous Molding.

Mr. Marshall: I found, on a trial of continuous pouring, what some of the gentlemen here to-night have suggested, that it is occasionally very expensive. If you are molding 30 tons a day with your usual help and you want to increase it to 40, the increase of expense is away out of proportion to the increased production. I gave it a trial and when the production was such that I could run to the utmost capacity of the works I found that the cost decreased. There is a time in all shops when continuous pouring and molding is not economical. I have gone back temporarily to the old system until things take a start and we can run with a full force. In that case I should like to go back to continuous pouring again. As far as division of labor is concerned there is no question of its success or failure. Labor can be divided and be divided profitably, not only to the workmen but also to the employer.

Now about the question of leaving the shop. I do not know what the experience of others has been, but it is very rarely, with good management, that a man should be kept after working hours. Unless something extraordinary happens he certainly ought to be allowed to quit at least 15 minutes before whistle time. I think that 15 minutes can be best employed by the foreman in seeing that the men are in proper condition to go on the street so that they will look like white men and be in fit condition to go back to work next morning. I believe also that where a foreman takes a little interest in his men and looks after their tone, that they shall keep themselves clean and neat, he goes a long way towards making good workmen. If a man has clean and tidy habits himself he will be very likely to make a good tidy molder.

Mr. Sweeney: In your continuous pouring, did you take the iron to the flask or the flask to the iron?

Mr. Marshall: We took the iron to the flask, I do not know but that it is preferable to take the flask to the iron. There is this one objection: In the course of the travel of the mold to the iron there are many chances of a mishap, more so than if the iron is carried to the mold. I am not prepared to say, however, just what the results would show in the two cases.

Mr. Sorge: I want to ask Mr. Marshall what was the cause of the increased percentage of cost when he molded 40 tons over 30.

Mr. Marshall: Supposing that we were working 50 molders. These 50 molders at eight hours' molding and two hours' pouring were capable of producing thirty tons of castings. We found that orders were coming in faster and that we were running behind. We wanted to make that 40 tons. To do that those molders had to remain at their benches and do 10 hours' continuous molding and we had to have extra labor to do the pouring, shake out the molds and take the castings out of the way of the molders. We found to increase the production this percentage, the amount of extra labor required and the expense were greater in proportion.

Mr. Ramsay: I wish to ask if you used the sand over and over? Did you have floor room enough to have cool sand all the time?

Mr. Marshall: To a certain extent the sand was used over and over.

Mr. Ramsay: I would like to ask if the castings were as nice in the evening as they were in the morning?

Mr. Marshall: I will say they were.

Mr. Ferguson: After listening to Mr. Hanna's statement that the most equitable way to do is to pay a molder for the time that he works, I would like to say that molders are human and the greatest people on earth to adapt themselves to their surroundings and conditions. If there was such a rule I don't think they would ever get through. I do not think the molder would ever plan to finish his day's work before six o'clock. He would not allow himself to be paid for eight, nine or nine and one-half hours' work. I do not see how that plan could possibly work. I think that the equitable way to settle that question is to have a set number of hours for this work and pay over-time after that. I believe in using a man's time. It is your own fault if you do not use it.

Mr. Thompson: I think it is to the interest of all foundrymen to have an established rule for working hours and the benefits that they would receive would come from their facilities and equipments. If there is a give-and-take system your equipment does not count for anything.

Mr. Sorge: The discussion pro and con has carried out the object of my suggestions. As to some of the remarks that it is not possible to train men to these things, it is simply a question of faith with one or the other of us. I believe that men can be trained to do special work. I have seen men who were thoroughly incompetent in a general way, put at special things and made to be experts. I think foundry work can be put on the same basis as other work. Whether labor shall be divided in one particular manner in one shop or in another manner in another shop, cannot be decided in a general discussion.

The meeting then adjourned.

The Magazines.

Henry M. Stanley, in an article on the "Development of Africa," which is to appear in the February *Century*, recalls the fact that troubles with the Boers in Southern Africa first induced David Livingstone to travel to the north, and so led the way to the opening of Equatorial Africa. Livingstone, who was a missionary at Kolobeng, accused his Boer neighbors of cruelty to the natives. They resented his interference. He published their misdeeds in the Cape newswapers, and his house was burned in revenge. This led to his leaving southern Africa and going to a region where he could follow in peace his vocation as a missionary, unmolested by the Boer farmers.

Dr. Harvey B. Bashore gives an interesting epitome of the furthest researches of geology in a rapid sketch of "The First Days of the World," in the February *Lippincott's*. "The Aerial Monasteries of Greece" are described by Charles Robinson. There are other entertaining and well written sketches, besides the complete novel, "Ground-swells" by Mrs. Jeannette H. Walworth.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

The sale of 140 lots, a condition of the location of a tin plate plant at Washington, Pa., by Griffith & Scott, of Pittsburg, has been made.

The Keystone Bicycle Co., has been incorporated at Chicago, with a capital stock of $10,000, to manufacture bicycles, etc., by L. G. Miller, F. A. Warren and L. Schneider.

The East Moline Tool Co., East Moline, Ill., capital stock, $76,000, has been incorporated to manufacture machinery: incorporators, Adolph W. Shirring, Charles H. Pope and Edward B. Kreis.

The Falcon Bronze Co.'s new plant at Youngstown, O., has started up and orders have been booked which will employ it for some time. The product will be brass and bronze castings, particularly such as are required by rolling mills and blast furnaces. At the annual meeting held last week the following directors were elected: G. B. Booth, John Tod, G. A. Doeright, W. W. Bonnell and Richard Garlick. The directors elected as officers: President, G. B. Booth; secretary and treasurer, John Tod; general superintendent, G. A. Doeright.

The new plant of the Finished Steel Co. at Haselton, O., Youngstown's suburb, was put in operation last week. The main building is 224x62 feet, the pickling department 70x20 and the boiler house 55x24 feet. Steam and electricity are both employed in operating the plant. Polished shafting is the principal product. P. M. Haas has immediate charge of the plant. The company is capitalized at $100,000, and its officers are C. Seymour Dutton, president and general manager; H. M. Garlick, vice president; Thomas E. Davey, secretary and treasurer.

New Construction:—

The Hood Machine Co., of Birmingham, Ala., will begin work at once on the erection of a boiler plant.

It is reported that the St. Louis Car Co. and the American Car Co., of St. Louis, will consolidate and erect a plant at Philadelphia, which will be run as a branch of their shops in St. Louis. They have secured an option on a 30-acre tract of land, below Bridesburg.

The Berlin Iron Bridge Co., of East Berlin, Conn., has just completed for the Ansonia Brass & Copper Co., of Ansonia, Conn., a new boiler house 65 ft. wide and 142 ft. long. The side walls are of brick and the roof is entirely of steel, covered with the Berlin Iron Bridge Co.'s patent anti condensation corrugated steel.

The reorganization of the Troy Steel Co., as successor of the Troy Steel & Iron Co., Troy, N. Y., is completed. The officers are F. S. Witherbee, president; G. A. Bell, vice-president and general manager; E. D. Arnold, chief engineer and general superintendent, and F. W. Edmunds, secretary and general sales agent. Last fall it was decided to adopt the basic Bessemer process and to locate the new plant on Breaker Island, near Troy, where a plant of three modern furnaces was built by the old company. The new buildings are now under way, some of them being roofed. The converting works building, which is of steel, 122 x 88 feet, will contain three 15 gross-ton converters, two 50-ton electric traveling cranes, three iron cupolas and two spiegel cupolas. Outside of the cupola house will be located two mixers of 150 tons capacity each.

Additions, Enlargements, Removals, Etc.:—

The additions to the plant of the Springfield (O.) Machine Tool Co. are now completed and with the new tools the company has installed the plant becomes one of the most complete machine tool manufactories in the country. Among the new tools lately purchased are a 48″x48″x24′ Gray planer, a 9′ improved Bickford radial drill, a No. 5 improved Landis grinder and others including one of the company's own 24′ bed 24″ lathes. The new addition to the shop is 50 ft. wide by 100 ft. in length, with 18 ft. walls and light on three sides. The company also has a foundry and makes castings for a number of the fine machine tool manufacturers of the country. Among orders lately received are six from England covering all lines of the company's machine tools. With one of the most

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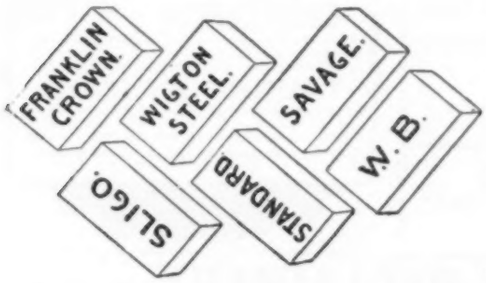

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modern and complete plants in the country and an excellent type of tools for its product, the Springfield Machine Tool Co. is making a good record for sales and for satisfactory performance by its tools.

Fires and Accidents:—

At Buffalo, N. Y., the Sherman S. Jewett Stove Works were destroyed by fire Jan. 14. The loss is $200,000. Insurance on the building, machinery and 7,000 stoves is $180,000.

General Industrial Notes:—

The Irondale rolling mill at Middleton, Ind., has resumed after several weeks of idleness.

The American Tin Plate Works at Elwood, Ind., are now operating full, with 1,250 hands.

The Alabama Rolling Mill at Gate City, Ala., has resumed operations after a shut-down of several weeks.

The new Pioneer furnace of the Cleveland-Cliffs Iron Co., at Gladstone, Mich., will blow in about March 1.

The eight-inch mill of the Brown-Bonnell Iron Co., Youngstown, has resumed after an idleness of five weeks.

At Lorain, O., the Johnson Co.'s steel plant which shut down before the holidays, will resume about Feb. 1. Some of the changes under way are requiring more time than was expected.

Buffers and metal polishers who have been on a strike at the Detroit Stove Works, have settled their grievance.

The Edgar Thomson Steel Works, which have been closed down for several weeks for repairs, have resumed operations.

The Oliver Iron & Steel Co., operating the Hainsworth Steel Works, Pittsburg, has made a reduction of 10 per cent in wages. The men accepted it.

The A. C. Hawes Co. has been incorporated at Chicago, with a capital stock of $15,000, to deal in coal, iron, etc., by A. C. Hawes, Fred W. Job and Miles S. Gilbert.

Molders at the foundry of the American Blower Co., at Detroit are on a strike for an increase from $2.25 to $2.50 a day. Non-union men are being imported to take the places of the strikers.

The present blast of Jefferson Furnace, of the Jefferson Iron Works, at Steubenville, O., has been very successful. In over 500 casts made since Oct. 1, 99 3-5 per cent of iron has been standard Bessemer.

The Sterling Steel Co.'s recent order from the Government has made necessary extensive improvements in its plant at Demmler, Pa. Among the improvements are two annealing

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1—55″ Allen Riveter.
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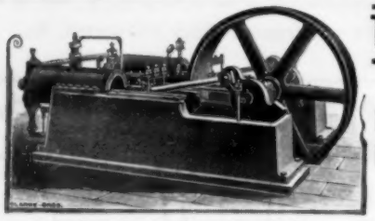

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furnaces, a gas producer and a large dynamo. The works are being operated to their fullest capacity.

At Lockport, N. Y., papers have been filed transferring under option to the Niagara Power & Development Co. 26,500 acres, the site of Love's Model City. The company says that it has a contract to furnish 25,000 horse-power to another company that will invest in a large steel plant.

Notices have been posted at the Sharpsburg, Pa., mill of Moorhead, Bro. & Co., fixing the puddling rate at $3. It is reported that some of the puddlers were willing to accept the new rate, but others refused. Meantime Amalgamated Association officers are endeavoring to organize the mill.

The output of the blast furnaces in Lawrence county, O., located in and about Ironton, was as follows in 1895, making a total of 103,061 tons, against 78,875 tons in 1894 and 68,475 tons in 1893: Sarah, 35,922; Hamilton, 24,882; Belfont, 23,583; Lawrence, 12,000; Hecla, 2,964; Olive, 2,100; Vesuvius, 1,600.

The Latrobe Steel Co. has succeeded to the business of the Chicago Tire & Spring Co. The offices in the Western Union Building, Chicago, will be retained until Feb. 1, when they will be removed to the Old Colony Building. Charles H. Ferry, formerly president of the Chicago Tire & Spring Co., continues with the business.

At Chambersburg, Pa., an execution was issued Jan. 20 on judgment notes for $6,475 against the Taylor engine Co., the National Bank of Chambersburg and others being plaintiffs. The plant will be sold, subject to a mortgage of $72,900. The works were established 15 years ago and the Taylor automatic engines have enjoyed a good reputation. Of late years there has been no profit in the business.

The first of several steam launches of special design for Southern Mexico has just been shipped by the Marine Iron Works, Clybourn & Southport aves., Chicago, the destination being 3,200 miles from that city, Shipments of this character are safely made by rail for the small and medium sized launches, but for larger work the same company builds only the complete outfits of marine machinery and equipment, for the native boat builders.

At Chicago, the Standard Electric Co made a voluntary assignment. The business was established in 1891, with a capital of $1,000,000, not all paid up. D. F. Perry, vice-president and manager, considers the assignment only temporary, and expects to be ready for business again soon, as there are two

or three dollars of assets for every dollar owed. Business has been dull for two years, with close competition. The company did a busines of $250,000 a year, and was one of the largest in Chicago in dynamo-making and arc and incandescent lighting.

The Cleveland Machine Screw Co., Cleveland, whose leading specialty, aside from automatic screw machines, is balls for bicycle bearings has had such a demand for bicycle manufacturing tools and balls for bicycle bearings, that for some months past, its works have been running 23 hours a day, using two sets of men. The company has sold all the automatic screw machines it could make, and could probably have disposed of more were it possible to fill orders within a reasonable time. It has been obliged to refuse foreign trade, and is now almost fully provided with orders for machines to be used in the business of 1897.

The suit brought by W. J. Rainey, the coke operator, against the Isabella Furnace Co., Pittsburg, ended in the United States Circuit Court at New York, in a verdict for the plaintiff for $34,800. The suit was for $75,000 damages. W. J. Rainey made a contract with the Isabella Furnace Co. immediately prior to the strike of 1894 for coke at 90 cents per ton, subject to any market advance. During the strike, coke sold as high as $3.50 a ton. A portion of the time Rainey was practically the only operator in the region able to run his plants. The dispute hinged on what was the market price of coke during the strike period. In this connection the defendants raised the question whether Rainey as the sole producer, could set a market price. The plaintiff contended that the market price is what coke will bring, and that the fact of its being sold by one person or many was not material.

The Standard Boiler Co., of Chicago, reports a good business for the past year. The Standard boiler is built by the well known Link-Belt Machinery Co. New and improved machinery having been put in for its manufacture, reducing the prime cost as well as making the various parts interchangeable. During the past year a number of large plants have been installed, among these being 4,000 h. p. for the North Chicago Street R. R. Co., at its new power station at Hawthorn ave., 500 h. p. for the Cincinnati Edison Co., at Cincinnati, 600 h. p. for the Western Electric Co. at its factory in Chicago. The Standard Boiler Co. reports good prospects for the coming year. It has moved into its new offices, 1120 and 1121 Marquette Bldg, Chicago.

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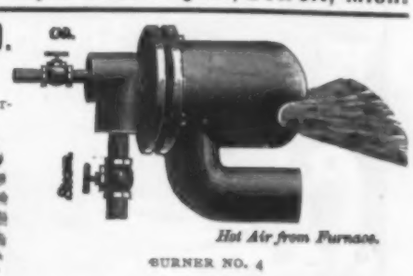

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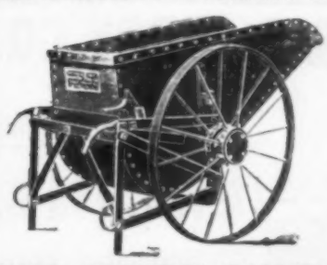

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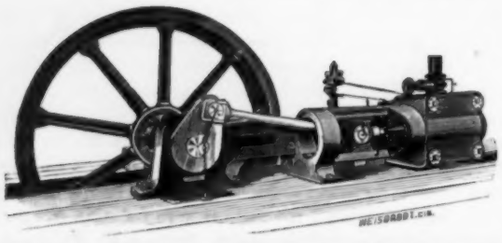

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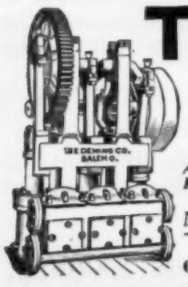

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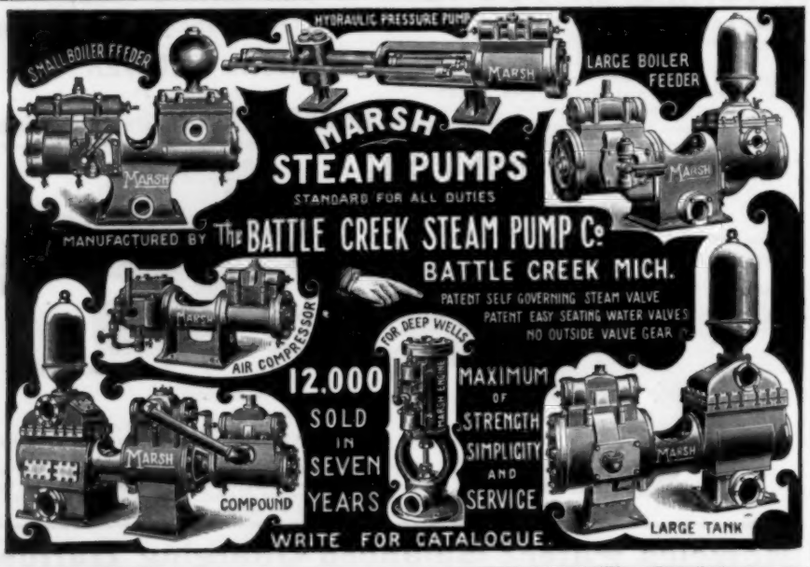

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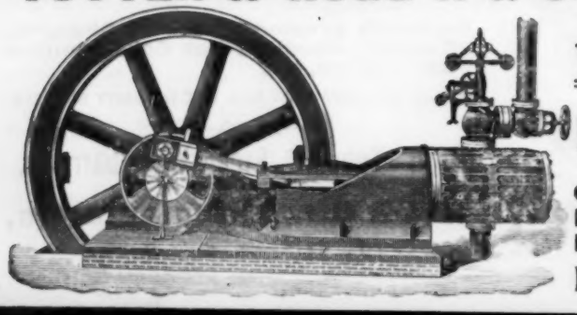

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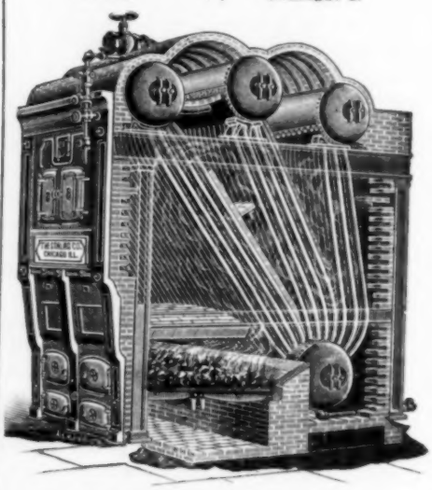

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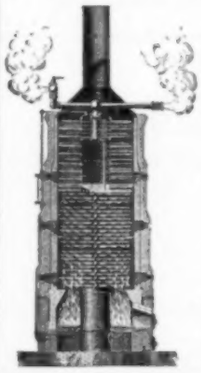

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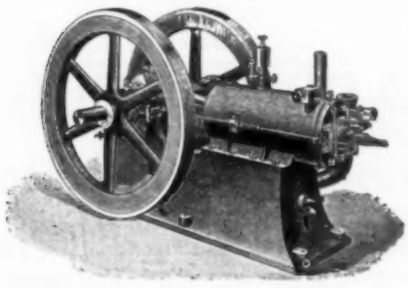

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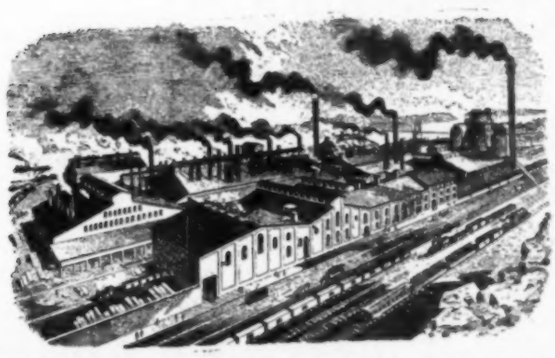

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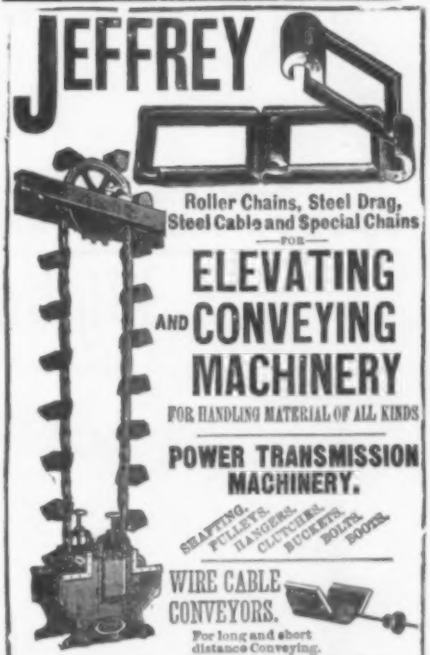

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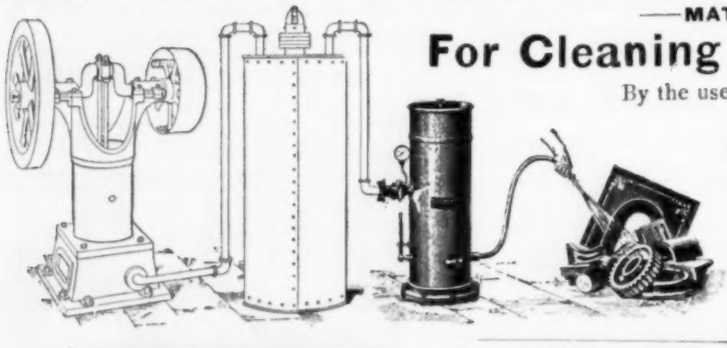
For Cleaning Castings, Forgings, etc



By the use of common, sharp, dry sand, and with a compressed air pressure of 15 lbs., this Apparatus will **Clean** all forms of castings **more thoroughly** than is possible by hand, for **half the total cost**, and in a space of time that cannot be conceived until the machinery has been seen in actual operation. For small castings a special tumbling barrel is worked in connection with the Sand Blast Apparatus. For further particulars apply to

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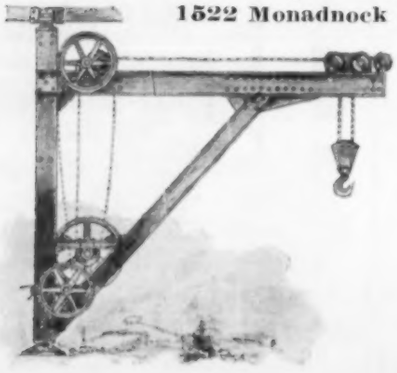

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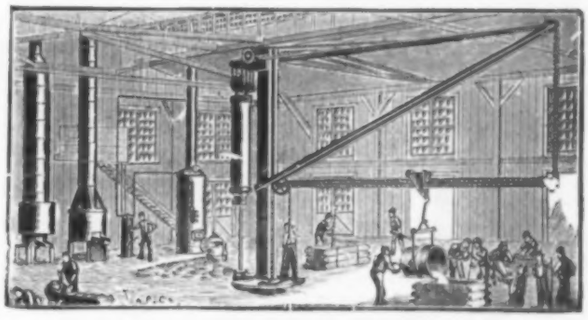

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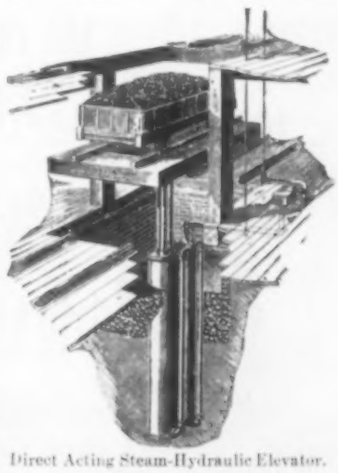

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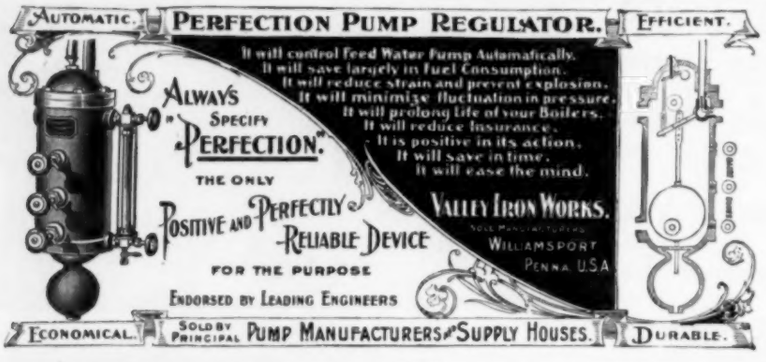
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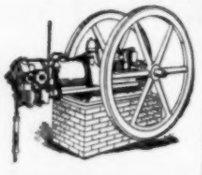

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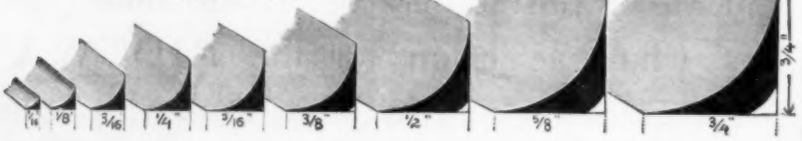

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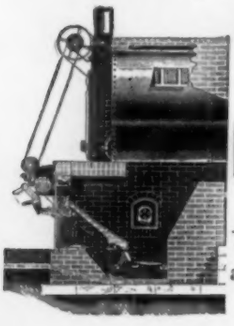

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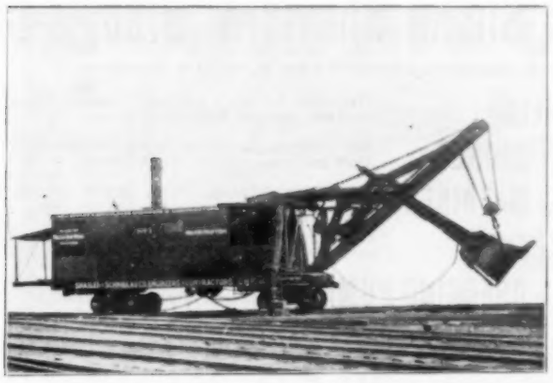

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60-inch Locomotive Boiler,
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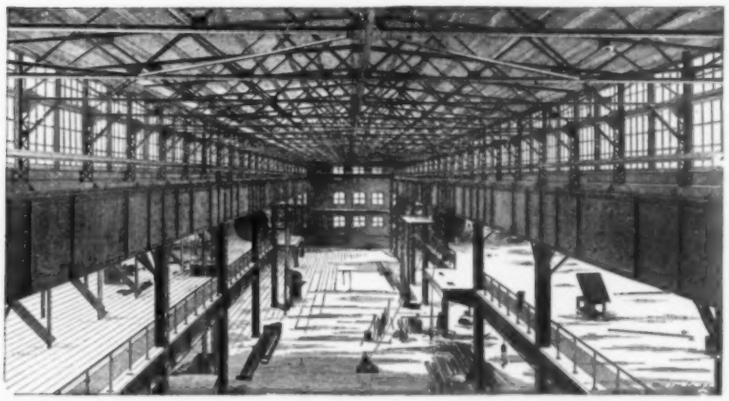

The above illustration, taken direct from a photograph, shows the construction of a Machine Shop designed and built by us for the Link-Belt Machinery Co., at Chicago, Ill. The building is 124 ft. in width by 407 ft. in length. Each side wing is 42 ft. in width and two stories high. The central portion of the building is 50 ft. in width, controlled by a hydraulic crane with a travel the full length of the building. This is probably one of the best designed modern Machine Shops to be found in the United States.

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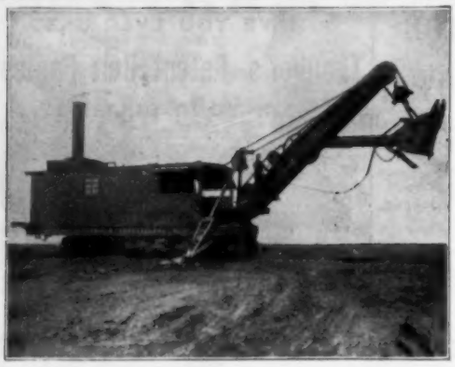

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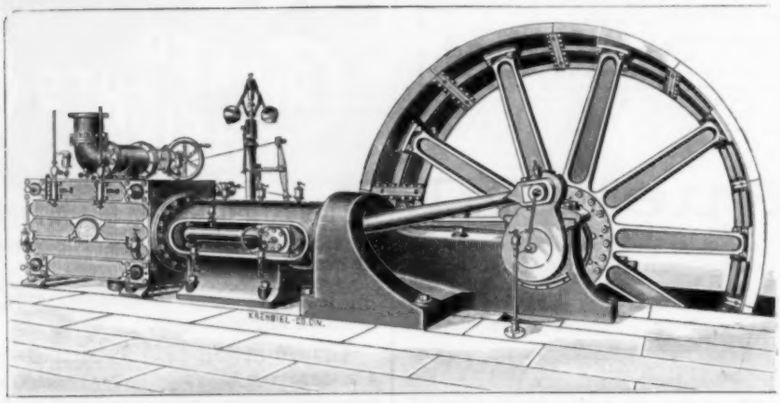

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Engines for Rolling Mills, Electric Railways and Electric Light.

Engines of all Sizes and for all purposes.

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Our "Giant" B Excavator,

Weight 55 tons, capacity 2,500 cubic yards per day.

Our "GIANT" C R. R. Excavator, weight 30 tons, capacity 1,500 cubic yards per day.

The Little "Giant"

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Capacity 1,500 cu. yds.

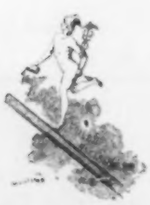
See next issue.

LOOK AT THIS!

Sample piece of FLUE taken from Locomotive No. 725 running for 7 months on Western Division of N. Y. C. & H. R. R. R. showing amount of SCALE adhering in that time.

If you desire further information, send for our circular which goes into the subject with cogent reasoning, as well as scientifically, corroborated by testimonials, any of which would convince a practical mechanic, but as "seeing is believing," send in your orders and save time, trouble and money by commencing the use of this known valuable **COMPOUND** at once. Canned in five-pound tins and packed in 100-pound cases, for Land Boilers, price $20 per case. Canned in one-pound tins and packed in 50-pound cases, for Locomotive Boilers, price $25 per case.

Delivered free to any Railroad Station in the United States. Should we not be represented in your town, and should you be well up in the machinery line, we are looking for agents.



Sample piece of FLUE taken from Locomotive No. 574 after running continuously 12 months on Western Division N. Y. C. & H. R. R. R., Empire Boiler Cleaning Co.'s Compound being used during that period. Boiler being freed and kept free from INCRUSTATION.

The Empire Boiler Cleaning Co., 19 Whitehall St., NEW YORK CITY. **AND THEN AT THAT.**

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AUTOMATIC MOLDING MACHINES,

For Sand Molds for Metal Castings.

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Our 16″ Duplex will mold, working Duplex, both parts of flask 12″x16″ and all sizes below; this same machine, when working Single will mold flask 16″x20″ and all sizes under.

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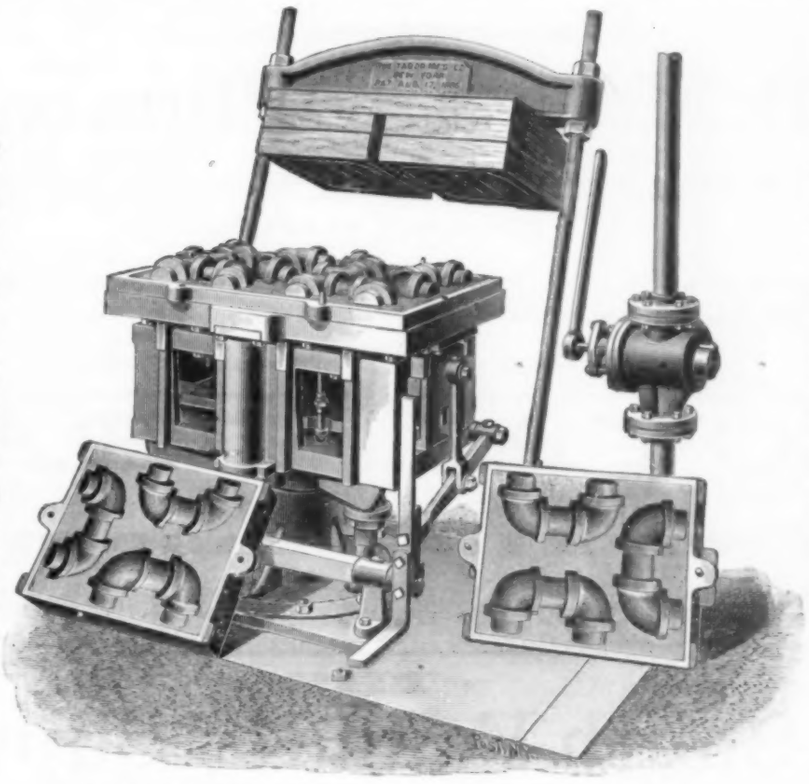
This feature allows a range of work, by one of our Machines, which would require a number of any other type. This is of the greatest importance to Foundries.



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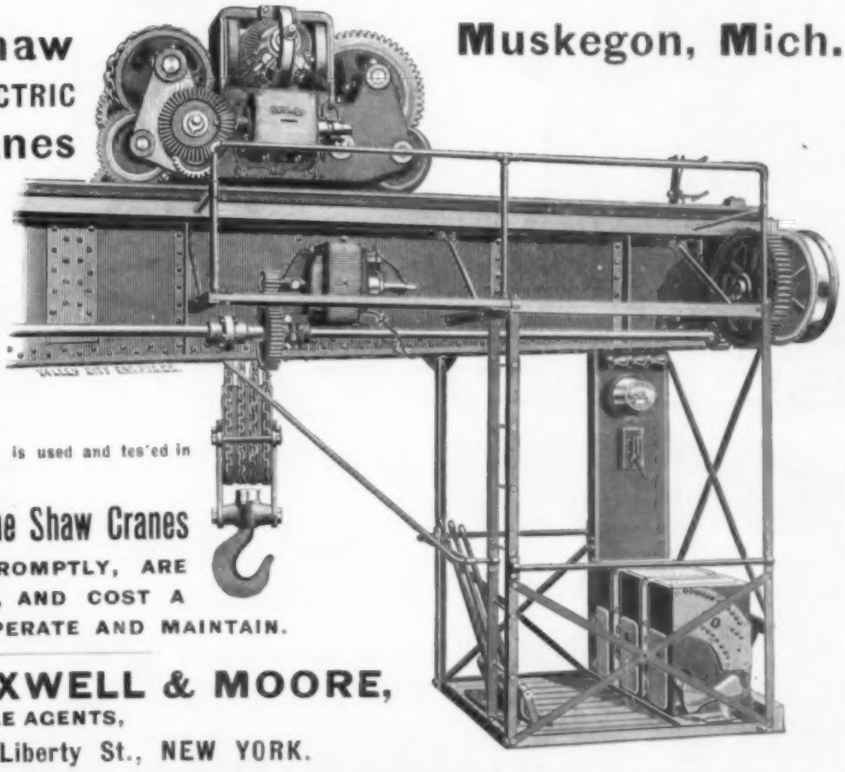

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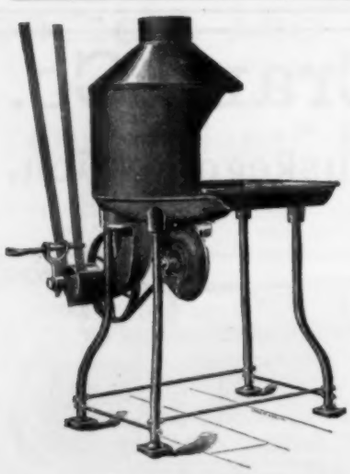

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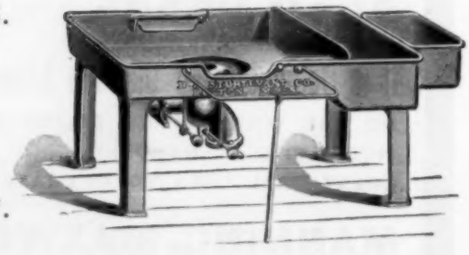

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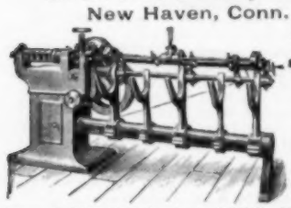

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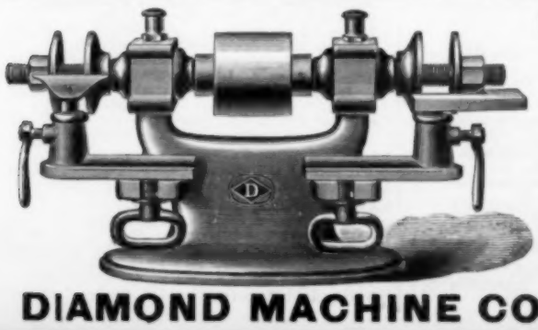

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W. A. Crook & Bro's Co., Newark, N. J.
The Edward P. Allis Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.
Link-Belt Machinery Co., Chicago, Ill.
Earle C. Bacon, New York City.

Motors—
Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

Moulding Sand—
Ohio Sand Co., Conneaut, O.
Ohio Sand & Clay Co., Columbus, O.

Molding Machines—
Tabor Mfg. Co., New York City.

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Canadian Copper Co., Cleveland, O.

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Oil Pumps—
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American Hoist & Derrick Co., St. Paul, Minn.

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Iron Clad Paint Co., Cleveland.
Jos. Dixon Crucible Co., Jersey City, N. J.

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Canton Leather Fillet Co., Canton, O.

Pattern Works—
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Harrington & King Perforating Co., Chicago.

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Vulcan Iron Works Co., Toledo, O.
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Playford Stoker Co., Cleveland, O.

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Enterprise Boiler Co., Youngstown, O.
Wm. B. Scaife & Sons, Pittsburg, Pa.

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Salem Wire Nail Co., Salem, O.

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No. 1 Specular, Bessemer	$4.75@ 5.25
No. 1 Bessemer hematite	4.25@ 4.50
Hematites No. 1 non-Bessemer	2.50@ 3.00
No 1. Specular, non-Bessemer	3.00@ 3.50

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CLEVELAND (f. o. b. cars):

Bessemer	$13 25
No. 1 Strong Foundry	13 75@ 14 00
No. 2 Strong Foundry	13 00@ 13 25
No. 1 Gray Forge, red short	11 25@ 11 50
No. 2 Gray Forge, neutral	11 00
No. 1 American Scotch	14 00
No. 2 American Scotch	13 50@ 13 75
Lake Superior Charcoal	15 50@ 16 00

PITTSBURG:

No. 1 Foundry	$13 50@ 13 75
No. 2 Foundry	13 00@ 13 25
Gray Forge	11 25@ 11 50
White and Mottled	11 00@ 11 25
Warm Blast Charcoal	16 00@ 17 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	13 00@ 13 25

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$14 50@$15 50
Local Coke Foundry No. 1	14 00@ 14 50
Local Coke Foundry No. 2	13 50@ 14 00
Local Coke Foundry No. 3	13 00@ 13 50
Local Scotch Foundry No. 1	14 00@ 14 50
Local Scotch Foundry No. 2	13 50@ 14 00
Local Scotch Foundry No. 3	13 00@ 13 50
Southern Coke No. 1	12 85
Southern Coke No. 2	12 60
Southern Coke No. 3	12 35
Southern No. 1 Soft	12 85
Southern No. 2 Soft	12 60
Southern Silveries No. 1	13 35
Southern Silveries No. 2	12 85
Jackson Co. Silveries	14 50@ 16 00
Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
Ohio Strong Softeners	15 00@ 15 50
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	
Coke Bessemer	

CINCINNATI (reported by Rogers, Brown & Co.)

Southern Coke No. 1, Foundry	$11 75
Southern Coke No. 2 and No. 1 Soft	$11 50@ 11 75
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	13 50@ 14 00
Jackson County Silvery No 1	14 00@ 15 00
Southern Coke, Gray Forge	10 75
" " Mottled	10 50
Standard Alabama Car Wheel	15 75@ 16 25
Tennessee " "	14 50@ 15 00
Lake Superior " "	15 75@ 16 25

BUFFALO (reported by Rogers, Brown & Co.)

No. 1 Foundry Strong Coke Iron Lake Superior Ore	$13 50
No. 2 Foundry Strong Coke Iron Lake Superior Ore	13 00
Ohio Strong Softener No. 1	14 50
Jackson Co. Silvery No. 1	15 25@ 15 75
Lake Superior Charcoal	15 50
Southern Soft No. 1	13 40
Hanging Rock Charcoal	17 50

ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$12 25
Southern Coke No. 2	12 00
Southern Coke No. 3	11 75
Southern Gray Forge	11 25
Southern Charcoal No. 1	14 50@ 15 00
Missouri Charcoal No. 1	14 00@ 15 00
Ohio Softeners	16 00@ 17 00
Lake Superior Car Wheel	17 00@ 17 50
Southern Car Wheel	16 50@ 17 00

OLD RAILS AND SCRAP METAL.

	GROSS TONS
Old iron rails	$16 00
Old steel rails	12 50
Old car wheels	13 00
	NET TONS
No. 1 R. R. wrought scrap	$11 00
Mill scrap	9 50
No. 1 Machine cast scrap	10 00
Iron axles	16 00
Axle turnings	8 50
Wrought turnings (free from cast)	8 00
Cast borings	7 00
Uncut wrought iron boilers	5 00
Steel boiler plates	10 00
Grate bars	6 50
Pipes and flues (clean)	8 50
Tank iron	9 00
Hoop and band iron	7 00
Sheet iron	6 50
Wrought drillings	7 50
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.49c@1.54c	
Angles	1.34c@1.39c	
Tees	1.49c	
Universal Plates	1.40c	
Sheared Plates	1.50c	

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 60
4½ to 6 by ⅜ to 1 inch	1 65
1¾ to 6 by 1¼ to 2 inch	1 85
1¼ & 1¾ by ⅜ to ¾ inch	1 60
1 & 1¼ by ⅜ to ¾ inch	1 70
⅛, ¼, ⅜, by ⅜ to ¾ inch	1 80

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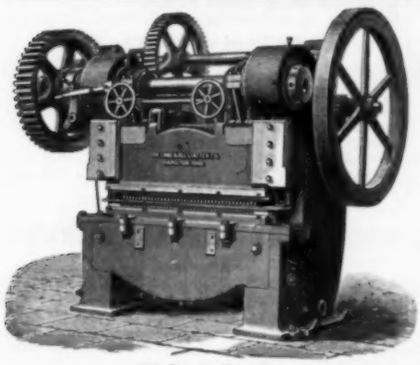

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IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅝ inch	1 60
2 to 2⅝ inch	1 80
2¾ to 3¼ inch	1 75
3¾ to 4 inch	2 10
4¼ to 4½ inch	2 70
4¾ to 5 inch	2 90

Oval.

⅜ to 1¼ inch	1 80
⅓ to ¾ inch	1 80
½	2 00
⅝	2 20

Half Oval and Half Round.

1⅛ to 3 inch	2 15
⅜ to 1⅝ inch	1 95
⅓ to ¾ inch	2 20
½	2 35
⅝	3 45

Heavy Band.

1¾ to 6 by ¼ and 5-16 inch	1 70
1 to 1⅜ by ¼ and 5-16 inch	1 75
⅜ to ⅞ by ¼ and 5-16 inch	1 85
½ to ¾ by ¼ and 5-16 inch	2 10

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	2 15
1 7-16 to 2, No. 17, 18 and 19	2 20
1 7-16 to 2, No. 20	2 30
1 7-16 to 2, No. 21	2 40
1 7-16 to 2, No. 22	2 50
1⅛ to 1⅜, No. 13, 14 and 15	2 20
1⅛ to 1⅜, No. 16, 17 and 18	2 25
1⅛ to 1⅜, No 19 and 20	2 30
1⅛ to 1⅜, No. 21	2 40
1⅛ to 1⅜, No. 22	2 50
15-16 and 1 inch, No. 13, 14 and 15	2 15
15-16 and 1 inch, No. 16, 17 and 18	2 30
15-16 and 1 inch, No. 19 and 20	2 40
15-16 and 1 inch, No. 21	2 50
15-16 and 1 inch, No. 22	2 60
⅞, No. 13, 14 and 15	2 40
⅞, No. 16, 17 and 18	2 50
⅞, No. 19 and 20	2 60
⅞, No. 21	2 70
⅞, No. 22	2 80
13-16, No. 13, 14 and 15	2 50
13-16, No. 16, 17 and 18	2 60
13-16, No. 19 and 20	2 70
13-16, No. 21	2 80
13-16, No. 22	2 90
¾, No. 13, 14 and 15	2 60
¾, No. 16, 17 and 18	2 75
¾, No. 19 and 20	2 85
¾, No. 21	2 95
¾, No. 22	3 05
11-16, No. 13, 14 and 15	2 85
11-16, No. 16, 17 and 18	2 90
11-16, No. 19 and 20	3 00
11-16, No. 21	3 10
11-16, No. 22	3 20
11-16, No. 23	3 30
⅝, No. 13, and 15	2 90
⅝, No. 16, 17 and 18	3 00
⅝, No. 19 and 20	3 10
⅝, No. 21	3 20
⅝, No. 22	3 30
⅝, No. 23	3 40
9-16, No. 13, 14 and 15	3 10
9-16, No. 16, 17 and 18	3 20
9-16, No. and 20	3 30
9-16, No. 21	3 40
9-16, No. 22	3 50
9-16, No. 23	3 60
7-16 and ½ inch, No. 13, 14 and 15	3 30
7-16 and ½ inch, No. 16, 17 and 18	3 40
7-16 and ½ inch, No. 19 and 20	3 50
7-16 and ½ inch, No. 21	3 60
7-16 and ½ inch, No. 22	3 70
7-16 and ½ inch, No. 23	3 80
⅜, No. 13, 14 and 15	3 80
⅜, No. 16, 17 and 18	3 90
⅜, No. 19 and 20	4 00
⅜, No. 21	5 31
⅜, No. 22	4 40
⅜, No. 23	4 55

Light Band.

1⅜ to 6 by ⅛ to 3-16 inch	1 90
1¼ to 6 by Nos. 11 and 12	1 95
1 to 1¾ by ⅛ to 3-16 inch	1 95
1 to 1¾ by Nos. 11 and 12	2 00
⅛ and 13-16 by ⅛ to 3-16 inch	2 10
⅛ and 13-16 by Nos. 11 and 13	2 15
⅛ and 11-16 by ⅛ to 3-16 inch	2 20
⅛ and 11-16 by Nos. 11 and 12	2 25
⅛ and 9-16 by ⅛ to 3-16 inch	2 35
⅛ and 9-16 by Nos. 11 and 13	2 40
¼ by ⅛ to 3-16 inch	2 50
¼ by Nos. 11 and 12	2 55

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12	2 10
⅛ inch, " " " " 13 and 14	2 20
¼ inch, " " " " 11 and 12	2 25
¼ inch, " " " " 13 and 14	1 55

Sheet Iron.

No. 10	2 10
No. 12	2 20
No. 14	2 25
No. 15-17	2 35
No. 18	2 50
No. 20	2 65
No. 22-24	2 75
No. 25-26	2 85
No 27	2 95

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 00
Shell	2 15
Flange	2 25
Marine Flange	2 60
Fire Box	2 70

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1⅛c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08

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BRIDGEPORT, OHIO,

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TIN AND TERNE PLATE, Iron and Steel Plates and Sheets, Plain Black, Painted, Corrugated and other forms of ROOFING, SIDING and CEILING. Patent Leveled Galvanized Sheets, BARS, Light Section Rails, ANGLES, Tees, Channels, and other Miscellaneous Bars and SHAPES.

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Send for Illustrated Catalogue giving full description, etc.

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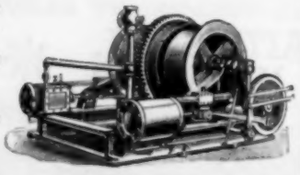

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POCAHONTAS FLAT-TOP COKE.

So low in ash that it requires no fluxing for foundry purposes. Our foundry and furnace coke was awarded the first premium at the World's Fair in 1893.

AVERAGE ANALYSIS OF COKE.

Moisture	00.196	Sulphur	00.677
Fixed Carbon	93.625	Ash	05 004
Volatile Matter	00.494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke

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FROM 10 LBS. UPWARD.

Made from Best Open-Hearth Steel.

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INCORPORATED.

Successors to TURNER, DICKINSON & CO.

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FRICTION CLUTCHES, HANGERS, PILLOW BLOCKS & PULLEYS.

Large Stocks on Hand. Shipments Promptly Made.

7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅜ to 11-16 and 4⅛	.10
⅝ to 6 in.	.10¾
¾ to 9-32 and 6¾ to 7 in.	.11
7⅛ in	.13

Flats.

	cts. lbs
2 to 9-16 in. wide by 2 to ⅝ thick	.6

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 50
Open-hearth Tire	"	1 80
Open-hearth Spring	"	2 20
Sleigh Shoe	"	1 90
Toe Calk	"	2 10
Cutter Shoes, tapered and bent	"	2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam.	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 65
Butt " " "	dis. 55
Lap " galv. "	dis. 52½
Butt " " "	dis. 50
Boiler tubes 2¼" and smaller	dis. 62½
Boiler tubes 2¼" and larger	dis. 65
Casing screw and socket joint	dis. 52½
Casing inserted joint	dis. 47½

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis
Horton's Universal	dis
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis
" " Gear Cutters	dis

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

SHIFFLER BRIDGE COMPANY,

BUILDING DEPARTMENT.

SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING-MILLS TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

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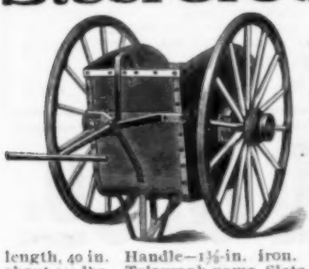
228 Lumber Exchange, Minneapolis, Minn.

Steel Ore or Charging Cart



This cart is largely taking the place of the charging barrow, and is used in place of them by the newest and best equipped plants. The weight of the load is directly on the axle and is very easily dumped. Owing to the large diameter of the wheels, the large load is easily carried. Body made of No. 8 steel, banded around top with ⅛x1½ in. iron. To stiffen sides and support axle, a ¼-in. steel sheet 12x24 in., and a ⅜-in. steel sheet 6 in. square is securely riveted to inside of body. The axle passes through the center of each sheet and through the cart, and is riveted to body by iron hangers.

A steel shield is riveted to body over axles to prevent dirt from getting into the wheel-boxes and cutting them. Wheels —First quality wagon wheels 48 in. in diameter, painted, striped and varnished; 1½x⅝-in. tire; 14 spokes. Axles—Steel 1⅝ in. square. Body—Width, 31 in., height, 33 in.; length, 40 in. Handle—1⅜-in. iron. Legs and Braces—⅜x1½-in. and ½x1½ in. Weight, complete about 540 lbs. Telegraph name, Slate. (3)

Lansing Wheelbarrow Co., Lansing, Mich.

W. J. McKINNIE. Pres. W. A. MADISON, Sec'y and Treas.

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A perfect smoke preventing furnace; perfect combustion, minimum of expense, simple in construction and economical.

A test of three tubular boilers of Cleveland Water Works, made Oct. 4th, 1895, by a waterworks engineer, shows an evaporation of over ten pounds of water to one pound of nut coal, and during the test the stack was entirely free from smoke.

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Cleveland Union Station.

Pennsylvania Lines.

Foot of Bank Street.

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* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	* 5:00 pm	* 8:30 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:10 am	* 5:45 pm
Akron and Columbus	* 8:10 am	*5:45 pm
Akron, Columbus & Zanesville	†2:45 pm	†12:10 pm
Columbus and Cincinnati	* 8:00 pm	* 7:30 am

The Cleveland Terminal & Valley R. R. Co.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Valley Jctn. & Way Stations	*6:30 P M	*7:10 A M
Akron, Canton & Valley	*10:10 A M	*3:15 P M
Akron, Canton & Chicago	*8:10 A M	*6:30 P M
Akron, Canton & Wooster, Defiance, Garrett, Marietta, Wheeling, Washington, D. C., and Baltimore	†2:55 P M	†11:00 A M

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FINE SITES FOR NEW MILLS, BEST OF FREIGHT FACILITIES,

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This will give you the population, city and county debt, death rate, assessed valuation of property, tax rate, annual shipments, raw materials, industries desired, etc.

To sound industries, which will bear investigation, substantial inducements will be given by many of the places on the lines of the Illinois Central R. R., which is the only road under one management running through from the North-Western States to the Gulf of Mexico. GEO. C. POWER, Industrial Commissioner I. C. R. R. Co., 506 Central Station, Chicago. I-2-'94

Emery.

	No. 4 to No. 54 46 gr.	54 to Flour, C. F. 150 gr.	F. FF.
Kegs, 100 lb	4⅝c	5 c	2⅝c
½ kegs 50 lb	4¾c	5⅛c	2¾c
¼ kegs 25 lb	5 c	5⅜c	3 c
10 lb cans, 10 in case	6 c	6⅜c	5 c
10 lb cans less than 10	10 c	10 c	7⅜c

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Barder, Adamson & Co. ..... dis 50@50&5
H. H. Barton ..... dis 50@50&5

Emery Wheels.

Detroit ..... dis 60@70
Norton's ..... dis 60@70
Grant ..... dis 60@70
Sterling ..... dis 60@70
Celluloid ..... dis 10&33⅓
Northampton ..... dis 55
Crystal ..... dis 65@70
Vitrified ..... dis 60@70
Vulcanite ..... dis 60&10
Hamden ..... dis 60&10@70
Cyclone ..... dis 60@60&10

Files.

Arcade ..... dis 60&10@60&10&10
Nicholson ..... dis 60&10@60&10&10
" X. F. ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
McClellan ..... dis 60&10@60&10&10
Disston's ..... dis 60@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50
Industry File Works Hand Cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs 12c
" " " " over 5 lbs 10c

Jack Screws.

Illinois Bolt Co. list ..... dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5⅝	4½	4	3½	3⅛
Hexagon	15¾	11¾	8¾	6	5⅜	5¾	
Washers	9	8	7	5	4½	4⅛	4⅜

In lots less than 100 lbs, ⅛ lb add ¼c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887 ..... dis 85
Standard Penny Nails, 100 keg card rate
Car lots $2.30
Less than car lots $2.50

Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ⅌ doz ..... dis 10@10&10

Picks.

Railroads, 5 to 6 lbs ..... $12 dis 60
" 6 to 7 lbs ..... $13 dis 60

Pulleys.

Iron Pulleys, Walker List ..... dis 50
Medart Pulleys ..... dis 50
Split Wood Pulleys ..... dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block ..... dis 20

Rivets.

Iron, Thousand, list November 1, 1894 ..... dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894 ..... dis 60@65
Copper ..... dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list ..... dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 55
Pulley Taps ..... dis 40

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 15@20
Howard ..... dis 35

Wire.

New List, Apr. 9, 1894

Brass ..... dis 4c
Copper ..... dis 4c
Bright and annealed, Nos. 6@18 ..... dis 70&10@75
" " Nos. 19@26 ..... dis 75@75&5
" " Nos. 27@36 ..... dis 75&10&5
Coppered Nos. 0 to 18, market list ..... dis 70@70&5
Galvanized Nos. 0 to 18 " " ..... dis 65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
Annealed Fence, Nos. 8 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... 95c ⅌ lb dis 30

Wrenches.

Coe's genuine ..... dis 50
Girard Standard ..... dis 70&10
Agricultural ..... dis 75&10
Mechanic's ..... dis 55&10&5
Bemis & Call's Combination ..... dis 35
Donohue's Engineers ..... dis 20&10
Lamson & Sessions Engineers ..... dis 60
Billings & Spencer's Drop Forged ..... dis 25
William's " " ..... dis 25
Alligator " " ..... dis 40

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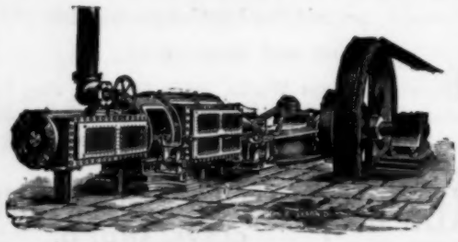

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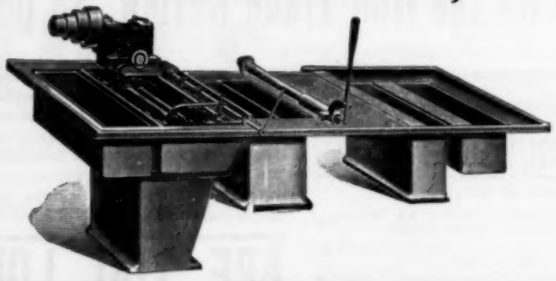

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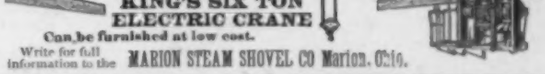

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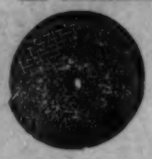

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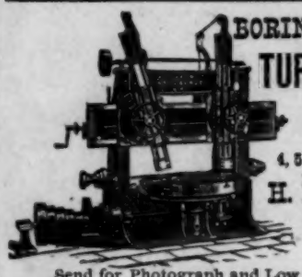

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